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A CHILTON PUBLICATION

The Iron Age

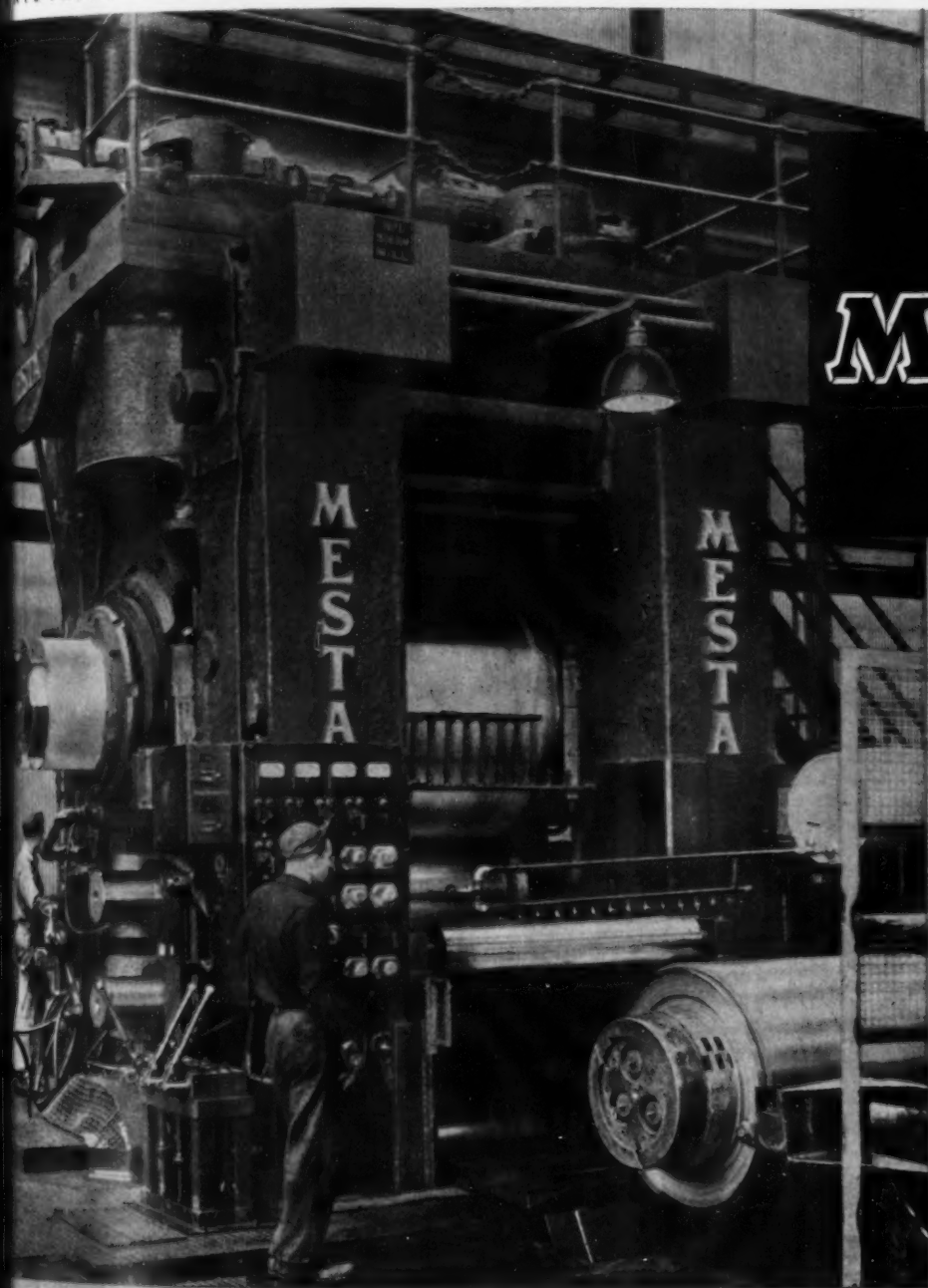
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NATIONAL METALWORKING WEEKLY

February 5, 1953

ENTS PAGE 2

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higher speed COLD MILLS

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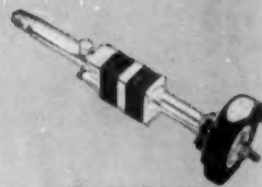
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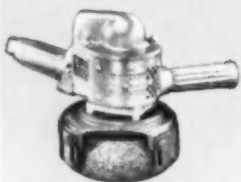
SCALING HAMMERS



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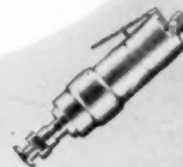
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Special bulletins on specific tools.

AIR

THE **ROTOR TOOL** CO.
CLEVELAND, OHIO

UNBIASED ANALYSIS OF PORTABLE TOOL PROBLEMS

HIGH CYCLE

THE IRON AGE

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Editorial

The Iron Age

FOUNDED 1855

This Is America

IT takes more than a slide rule or a dollar sign to describe America. It is difficult to tell others what makes us tick, work, love, cry or fight.

Many abroad do not know us; many at home do not comprehend America. As a group we do not go in for long explanations or excuses.

In the past few weeks we have seen a kaleidoscope of America. It did a better job of explaining than thousands of words. Here are a few patterns taken from that continually changing picture:

President Eisenhower quickly moving to his wife with a kiss and a pat on her elbow immediately after he was sworn in. Millions saw him and understood.

God had first mention in the inaugural ceremonies, thus carrying on the tradition of the American constitution.

Ex-President Truman looking relieved but wistful. That too was understood by millions of wives including his own.

Ex-President Hoover riding as a guest of honor in the parade—quite dissimilar to 20 years ago. People recognize a man's hour of vindication.

New cabinet members learning quickly that getting along with people is the number one rule for those who would serve the people.

Photographers shouting "lower the flag" so they could take better pictures. Where else could that happen?

Governor Dewey of New York looking like he had won an election. America produces good losers who pull for the country.

A President's son bawling out his father for pulling him back from the battlefield—the father not knowing that the Ex-President (a family man) issued the order.

A single senator blocking the confirmation of eight cabinet members on the day the President was sworn in. They were okayed the next day.

Mr. Wilson of General Motors getting the works from a Senate Committee. He learned more about Congress and the people in 5 days than he had ever known—and acted accordingly.

Businessmen in government discovering that talking on the outside looking in is different than acting on the inside looking out.

Tom Campbell

Editor

February 5, 1953

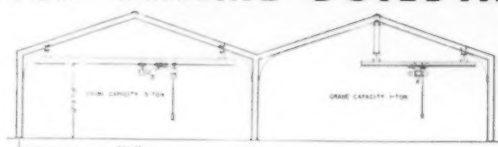


Photos courtesy of The Shaw Shovel Co., Lorain, Ohio.

Rigid frame structure by The Steelcraft Mfg. Co., Rosslyn, Ohio.

AMERICAN MONORAIL

EQUIPS RIGID FRAME BUILDINGS



with flexible overhead crane service

Don't let crane requirements stymie your consideration of rigid frame buildings. Packaged buildings not only provide definite savings in construction costs and erection time but can be equipped with crane service over the entire area. American MonoRail cranes up to 5-ton capacity are available for entire span or half span operation. If

you are planning plant expansion and considering rigid frame type construction, be sure to include American MonoRail cranes. Our engineers will gladly consult with you and show you cost and space saving advantages, in addition to original installation savings.

Write us today.

THE AMERICAN

MONORAIL

COMPANY

13103 ATHENS AVENUE

CLEVELAND 7, OHIO

Dear Editor:

Letters from readers

Businessman's Creed

Sir:

Although not in the metal industry we are subscribers to THE IRON AGE. Your editorials are food for thought and, like you, we are intensely interested in our country and the welfare of its people.

Your editorial "A Businessman's Creed" was so outstanding that we took the liberty to quote same almost word for word in our "News Card" and wish to apologize for doing so without your permission.

This News Card went to over one thousand of our customers and we felt that you would not object to as wide a dissemination as possible of what you believe to be forthright. Please accept our thanks and we shall look forward to many more articles in the future.

R. W. BUCKLEY

Windsor Card Co.
Chicago

Basic Marketing Data

Sir:

I note in your annual issue of THE IRON AGE that you have brought out another edition of Basic Marketing Data on the metalworking industry which brings down to date information given in the 1948 survey.

I have found the earlier data to be very useful and should like very much to obtain a copy of the 1952 report. In fact, I'd like to get three copies so our library would have two for circulation while I retain a copy in my file.

I find your annual issue to be a mine of information so wish to add the 1953 edition to my collection. I send \$2.00 herewith for that purpose.

E. A. GRAHAM
Economist, Metal Section

Bureau of Industrial Economics
Federal Trade Commission

P Charts

Sir:

It has come to my attention that there are two errors in the article "P Charts Improve Methods For Determining Downtime" by Mr. Denholm and myself, appearing in the Nov. 27 issue. One of the errors was an oversight in our office and the other error was a printing error.

In the right hand column on p. 111 a formula is given. It reads:

$$\bar{p} \pm 3 \sqrt{\frac{\bar{p}(1-\bar{p})}{N}}$$

The formula should be the same except that the 3 should be omitted. The same change should be made in the fifth column of tables I, II and

III. Also in the fifth column of tables I, II and III the square root sign was omitted.

G. NADLER
Associate Professor of
Industrial Engineering

Washington University
St. Louis

Sintered Metals

Sir:

We are interested in the machinability of sintered metals and their alloys and are looking for information either published by your magazine or other organizations with whom you are acquainted. We would like to know the drilling and machining speeds of the different metals.

Is there a possibility that you have information available on this matter?

F. A. VOSSENBERG
Asst. Manager-Director

Yale & Towne Mfg. Co.
Philadelphia

We move fast to serve our readers: An article on the preforming and machining of carbide shapes appears on p. 153.—Ed.

Fatigue Tests

Sir:

We are very much interested in the first item on the Newsfront page of your Jan. 15 issue stating that greatly extended fatigue life has shown up in rotating fatigue tests of vacuum melted 52100.

Could you advise where we can get more data on your news item?

F. LEISTER
Vice-President—Engineering

Fair Bearing Co.
New Britain, Conn.

Write to J. H. Moore, director, Metallurgical Dept., National Research Corp., 70 Memorial Drive, Cambridge 42, Mass., for further information.—Ed.

Getting Ahead

Sir:

Will you please send me a few copies of your editorial "How To Get Ahead" which was published in your Dec. 18 issue.

V. E. WALSH

Walsh Tire Supply
Philadelphia

Reversed

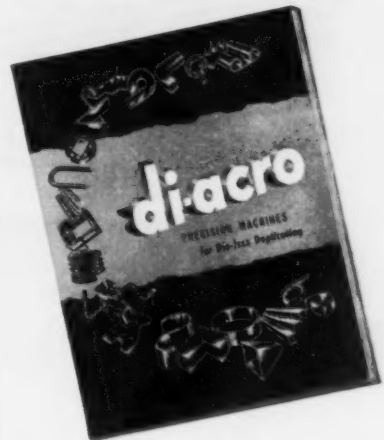
Sir:

In our recent article (Dec. 25 issue) on the sintered aluminum powder products by Mr. Gregory and myself, I note that figures 13 and 14 are in reverse order and also have the wrong captions. If you would change the figures and leave the captions as is they would be correct.

N. J. GRANT

Massachusetts Institute of Technology
Cambridge, Mass.

Request Your Copy Now!



New catalog shows how

"DIE-LESS DUPLICATING"
SAVES TOOLING COSTS,
SPEEDS PRODUCTION

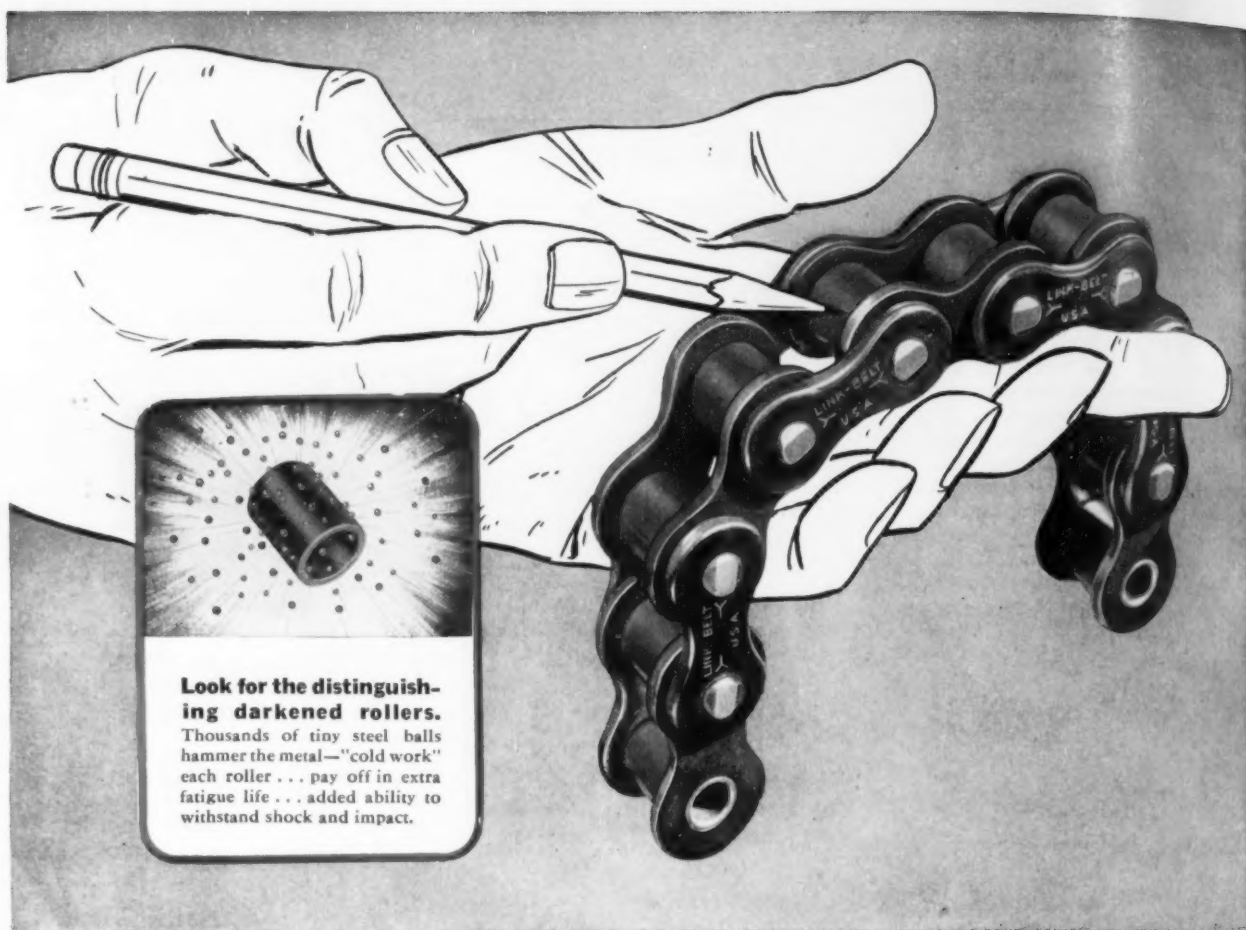
New 32-page catalog, chock-full of operating photographs, shows the wide variety of parts that can be formed and fabricated—often without the use of dies—by Di-Acro Metalworking Machines. Gives complete machine specifications and material capacities on 36 hand and power operated models in handy reference tables. Explains Di-Acro Engineering Service—it has helped solve many problems. Write for your copy now.

Di-Acro is pronounced Die-ack-ro. It is the registered brand name for both hand and power operated Di-Acro Benders, Brakes, Notchers, Punch Presses, Rod Parters, Rollers, and Shears.



**PRECISION
METALWORKING
MACHINES**

O'NEIL-IRWIN MANUFACTURING CO.
302 8th Avenue • Lake City, Minnesota



It's the **SHOT-PEENED** rollers that give your roller chain extra life!

... one of the extra-wear features you get with every LINK-BELT Roller Chain

POWER-TRANSMISSION engineers and metallurgists agree—shot-peened rollers mean longer roller chain life. That's just one of the engineering extras you get with Link-Belt Precision Steel Roller Chain. Another is Link-Belt's exclusive lock-type bushing.

Remember, too, Link-Belt's rigid material selection and controlled heat treating assure chain uniformity... no weak members.

Link-Belt builds a complete line of roller chain—single or multiple widths in $\frac{3}{8}$ " through 3" pitch; and double pitch, 1" through 3". Submit your chain problems to the Link-Belt office near you.



No partial bearing here
—bushing fits securely

Lock-type bushings increase ability to withstand severe operating conditions

A special manufacturing process securely locks the inside sidebars on the bushing, preventing lateral movement of the sidebars and eliminating a common cause of stiff chains. This Link-Belt development is applied on roller chains through 1" pitch and double pitch roller chains through 2" pitch.

LINK-BELT
Precision Steel Roller Chain

LINK-BELT COMPANY: Chicago 9, Indianapolis 6, Philadelphia 40, Atlanta, Houston 1, Minneapolis 5, San Francisco 24, Los Angeles 33, Seattle 4, Toronto 8, Springs (South Africa), Sydney (Australia). Offices, Factory Branch Stores and Distributors in Principal Cities.

Fatigue Cracks

by William M. Coffey

Neither Rain or Snow

Hardly anybody in the industry gets around as much as Darwyn (Monk) Brown, our Technical Editor. Fact is, he's out of the office so much gathering material, few people ever see this fabulous fellow and some long-time employees have only heard the swish as he zips by. About once a week, however, he sticks his head into Sully's (Managing Editor) office, says, "I'm Brown. Here's a story." And off he goes. A few weeks ago it was to Boston about a new process for welding beryllium copper from the Raytheon Manufacturing Co. In Boston he stayed at the Statler Hotel, famed for courtesy and service. On his return to the office he found a card saying a Miss Beck of the hotel had found a pajama top in the room he had vacated. "What to do with it?" she wanted to know. Brownie waits just long enough to write this letter and then zips out again.

Dear Miss Beck:

Regarding your note of January 13th and one pajama top. I estimate the valuation at \$1.00. As I recall, it was one of my older models which is now completely out of style and probably rather worn. My wardrobe now consists of halves of pajama sets and I can't remember which one is missing. Therefore, I'm at a loss to describe it, but it would have to be either blue or green as I have stuck to these two colors in these particular ensembles. If it is a blue or green and no one else claims it, I wonder if you could send it to me.

Sincerely,
Darwyn I. Brown

We have other editors just as keen. Take Bill Olsen. In getting the dope for last week's issue about how Republic Aircraft Corp. is training jig makers in local high school manual training shops at night, Oley, after getting the story, leaves with the others—and then finds he's forgotten his hat. Goes back for it. Then gets himself locked in the shop office—one of these spring locks. It was 3 a.m. before a kind watchman let him out. Keen.

Women's Page (for women)

The housewife's 30 year struggle to free ice cubes from trays has been ended. Servel, Inc. has announced a revolutionary new type of home refrigerator that freezes ice cubes without trays, stores the cubes in a basket and replaces

them as they are used. All you do now, girls, is simply reach in the refrigerator and help yourself to cubes, one at a time or by the handful. As you take them out, the automatic ice-maker replaces them. Ask THE MASTER for one. He takes 1A. He's loaded.

Recipe for Valentine's Cake

Measure into Mixing Bowl:
2 cups sifted cake flour
2 cups sugar
½ cup Crisco
Pinch of powdered graphite
3 squares melted chocolate
1 bar nodular iron

Mix thoroughly and beat vigorously by hand or mixer (medium speed) for 2 minutes. Then heat treat, or anneal, to convert cementite to nodular graphite for the impartation of ductility.

Restrict carbon to 2.35 per cent and hold silicon at 1.65. When cool, ice between layers and sides with beryllium catsup. Warning: Watch your temperature. Don't go over 2750 F.

Serve in heart-shape tins. The children will love it. Valentine's Day Natural.

The red-cockaded woodpecker is the only bird that excavates its nest cavity in the living pine tree. It returns to the same tree year after year.

Puzzlers

The West Side Mathematics Society, N. Y. C., Hobart Ellis, Sec'y., became interested in the old ladder puzzle. They solved it in fine shape but also wanted to know "where can our club get two copies of the Sea Scout Handbook?" Handling this column gets harder and harder, Tom. Can I go to Florida now?

Promise: Next week answers and winners to the ship and coin puzzles if it takes three pages.

New Puzzle

A column of soldiers marching at a constant speed is 10 miles long. A rider on a horse leaves the end of the column just as the head of the column starts crossing a bridge. He rides, at a constant speed, to the head of the column, turns around and rides back to the end of the column. He reaches the end just as the last man steps onto the bridge. How far did he ride? This is from Mr. John L. Linskey, Goodyear Aircraft Corp., Akron, Ohio.



productive WASHER installation

#2744



for cleaning
prior to tempering
of ESNA* self-locking nuts

METALWASH spray washer installed at Elastic Stop Nut Corporation plant in Union, N. J.

View at left shows a portion of ESNA's Heat Treating Department. Self-locking nuts are conveyed through two American Gas Reciprocating Furnaces into AGF conveyorized quench tanks. Mesh conveyors carry the work into **METALWASH** hot spray washer where quenching oil is removed prior to tempering.

METALWASH machine conveys the work directly into continuous tempering unit (not visible in photo).

*ESNA is the registered trade mark of Elastic Stop Nut Corp. of America.

metalwash engineering
experience is your
assurance of lasting
performance

METALWASH Finishing Engineer, a new quarterly publication, is available on request to engineers and executives to whom cleaning and finishing are operations of interest. Please write us on your company letterhead if interested in receiving the **METALWASH Finishing Engineer** regularly.



metalwash

**MACHINERY
CORPORATION**

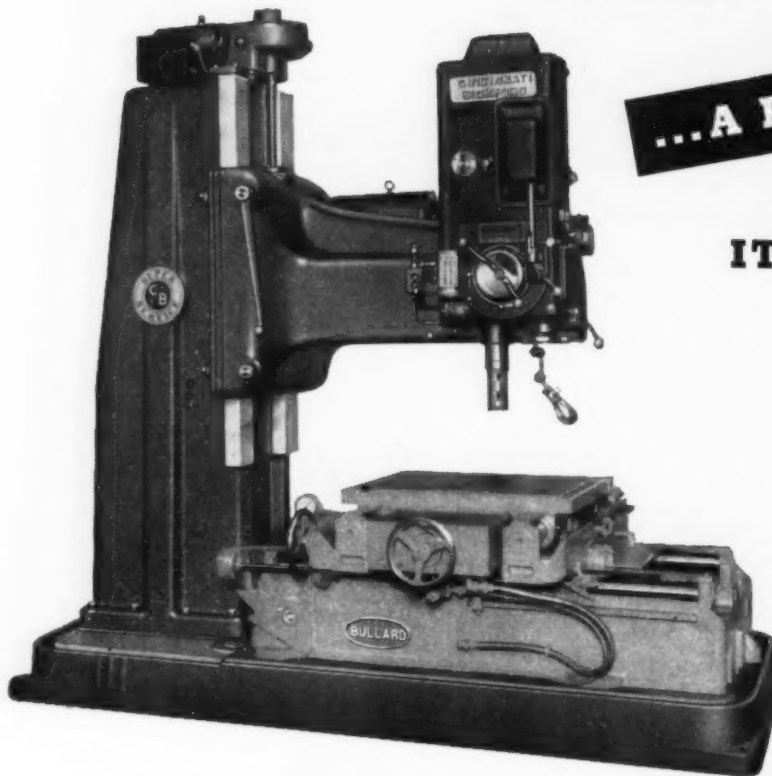
920 North Ave., Elizabeth 4, N. J.
representatives in principal cities

Here's thrifty accuracy

...A REAL COMBINATION

IT'S **BICKFORD**
IT'S **BULLARD**

...for **REPRODUCED
ACCURACY** without
a single jig



Outstanding accuracy, increased production and cost lowering can be assured by using this natural combination of the precision Cincinnati Bickford Drilling Machine and precision Bullard Spacer.

Jig expense, as well as storage and maintenance costs, are eliminated.

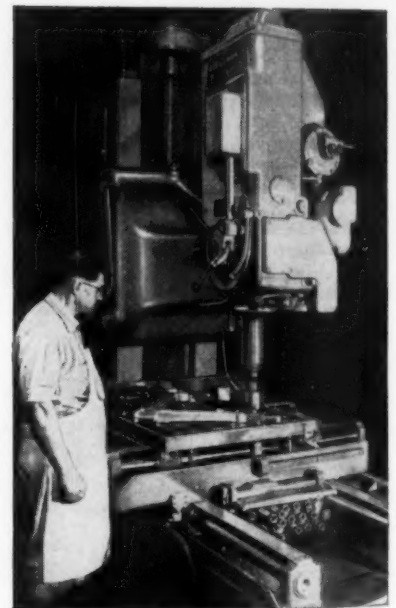
The new job can go into immediate production with interchangeable accuracy, with no lost time waiting for jigs and fixtures to be designed and built.

The wide range of speeds and feeds and the extra rigidity of the spindle and frame of this Cincinnati Bickford Precision Drilling Machine, and the convenience and ease of operator control, assure speed on the job and a wide range of use of the machine.

Actual production time is reduced as no jigs are handled by the operator.

For low cost, increased speed and great accuracy, look into this profit-making combination.

Write for Circular FH.



The Lockheed Aircraft Corporation, Burbank, California, finds the Cincinnati Bickford-Bullard combination ideal for fast, repetitive drilling on a variety of work.

PHOTO COURTESY
LOCKHEED AIRCRAFT CORPORATION

**CINCINNATI
BICKFORD**



RADIAL AND UPRIGHT DRILLING MACHINES

THE CINCINNATI BICKFORD TOOL CO.

Cincinnati 9, Ohio U.S.A.

THE IRON AGE Newsfront

A NEW PRECISION CASTING INVESTMENT AND PROCESS eliminates vacuuming, tamping, vibrating and preheating of molds. It's said to produce castings from 2 oz to 2 lb in about 6 hr. Average burnout prior to casting is about 5 hr. Material costs are halved, it is claimed.

LATEST SAFETY GIMMICK FOR BIG PLANES is an anti-wheel slide device which permits braked plane wheels to continue rotating if they bounce on landing. Used with air or hydraulic brakes, the unit eliminates ground loops, cuts blowouts, skid wear.

TREND TO HIGH SPEEDS IN ROTATING PARTS is resulting in greater demand for precision balancing equipment. Part of this interest stems from the jet program. But there is renewed interest in balancing machines up to 100 tons for testing big turbines where precision balancing is a must.

DEMAND FOR ALL TYPES OF CONSTRUCTION MATERIALS is expected to stay high this year. Washington predicts 1 million new residential housing starts. Employment of about 875,000 full-time workers in this industry alone is expected.

LONG HORN (TEXAS CITY) TIN SMELTER OPERATION on a permanent basis is sought in legislation being pushed by defense agencies. Now contracts and commitments can be made only on a short term basis. Proposal is to sell to private interests with government retaining right to recapture if private operation falters.

EXPERTS SAID IT COULDN'T BE DONE, BUT one small company has developed an artificial rubber which remains flexible within a temperature range of -65° and 500° F. It is used as a coating material on flexible wire and fabric tubing.

APPLIANCE MEN ARE LISTENING TO HOUSEWIVES—and what they hear sounds good. There's a growing demand for labor-saving equipment such as freezers, dishwashers. More new homes and the desire to modernize existing kitchens will keep appliance firms buzzing.

STEELMAKING RAW MATERIALS ARE IN BETTER SUPPLY than a year ago—despite outlook for higher consumption rates. Ore stocks are adequate, if not bountiful; manganese supply will do; scrap outlook is excellent contrasted with a year ago. Some steel firms have enough scrap on hand to last until spring.

NPA QUOTAS SEEM TO BE GETTING SCANT NOTICE from automakers now in their first quarter production rush. Projected schedules, if continued through March, should result in 1.4 million vehicles. NPA quota is 1,250,000.

VARIABLE PITCH SHIP PROPELLERS which drive a ship backward or forward are being tested by a New York firm. Applied to commercial use for the first time in this country, the propellers can be switched into reverse without stopping ship engines.

A ROBOT TRAIN WATCHER has been installed by Erie R.R. It helps regulate traffic. Individual caboose coil, a track coil and dispatcher's control mechanism record pertinent data as specially equipped trains pass the track coil.

February 5, 1953

NEWSFRONT

NEWSFRONT

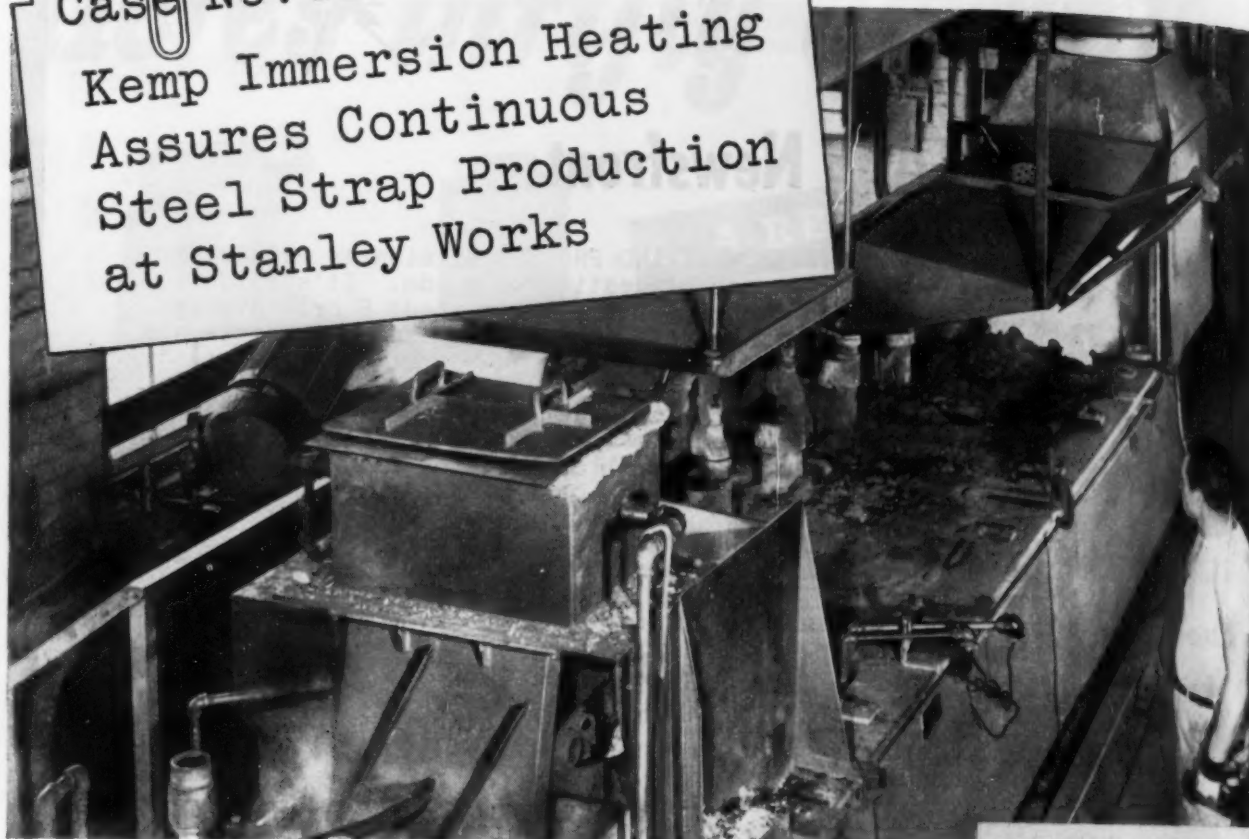
NEWSFRONT

NEWSFRONT

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Case No. 44

Kemp Immersion Heating Assures Continuous Steel Strap Production at Stanley Works



How Stanley doubled steel strap capacity overnight... slashed fuel costs, too

Today this bustling division of the famous Stanley Works at New Britain, Conn., turns out steel strapping on a 24 hour basis. Starting with raw, high carbon steel on giant spools, strap is semi-annealed, finished, coated and rewound again for shipping in one *continuous* process. New rolls of raw steel are simply spot-welded to the ends of rolls to eliminate any interruption.

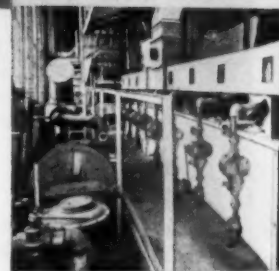
Kemp Eliminates Bottleneck

From an output limited by the capacity of a gas underfired pot, production was doubled on the installation of a 32 ton Kemp Immersion Melting Pot. In addition, Kemp's *greater* heating surface, *faster* heat recovery, *lower* dross formation and *accurate*

temperature controls meant real savings in fuel costs. In the words of Mr. Harold Heckman, plant foreman, "Through quicker heating of this pot, we are able to maintain production schedules." And unlike underfired pots, Kemp units eliminate open flame hazards and excessive room temperatures.

Let Kemp Help with Your Problems

If you're dissatisfied with your present heating or melting equipment, consult Kemp first before you make any changes. Let Kemp Engineers show you how they can solve your tempering, annealing, descaling or coating problems quickly and easily. Then just like the Stanley Works, you'll be *time* and *money* ahead.

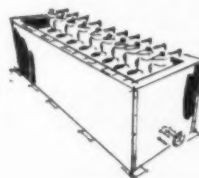


Rear view of Kemp Pot at Stanley Works shows gas feed lines, fire checks, and the Kemp Carburetor (left). Part of every Kemp installation, this carburetor assures complete combustion... without waste... without tinkering. Just set it, and forget it.

For more complete facts, ask for Bulletin IE-11. Write: C. M. KEMP MFG. CO., 405 East Oliver Street, Baltimore 2, Md.

KEMP OF BALTIMORE

IMMERSION MELTING POTS



CARBURETORS • BURNERS • FIRE CHECKS
ATMOSPHERE & INERT GAS GENERATORS
ADSORPTIVE DRYERS • SINGING EQUIPMENT

STEEL: Net Profits Kept Skidding in 1952

Preliminary reports show earnings down an average 22 pct . . . Strike costs, wage boosts main costs . . . But industry is optimistic on '53 operations and earnings—By T. Metaxas.

The steel industrialist who watched his net profits skid in 1951 should have been more horrified in 1952—for the trend did not reverse its field. Profits kept right on going down. But despite the second successive year of decline there are not many cries of calamity.

There is naturally regret over poor past performance. But with this comes a reasoned hope for a more bountiful future. Backing up this optimistic attitude of usually conservative steel executives is today's potent demand, chances for labor peace, tax cuts, and the junking of price controls by a Republican Administration.

Treasury Hurt—If there is any mourning to be done over the slide of steel income, the federal treasury should do its share. Last year mainly because of the 2-month steel strike it lost hundreds of millions of dollars in revenue.

Compiled by THE IRON AGE, preliminary 1952 income reports from 16 large and small steel producers stress that the profits downturn can be blamed on the steel strike, inadequate price relief to compensate for wage, other increases, and higher cash provisions for new facilities completed under defense certificates of necessity. But this last is not a genuinely negative factor.

Profits Dip—Of the 16 companies, 12 calculated their income for 1952 as a full fiscal year. For these net profits slid about 22 pct from 1951, a year not fondly viewed by steelmakers because net profits fell 13 pct from successful 1950.

Net profits of the 12 companies last year were \$407,040,500 against

\$523,357,408 in 1951. Jarred by the strike loss the industry poured 93,156,375 tons of steel in '52 against 105,134,553 tons in '51. Steel furnaces melted at an operating rate of 85.8 pct of capacity last year contrasted to 100.9 pct in 1951.

Saving Face—Salvaging some steelmaking glory for 1952 were fourth quarter operations in which a record 28,935,878 tons of steel were turned out at an operating rate of 106.0 pct of capacity. Producing at 103.0 pct in the same 1951 quarter the industry made 26,794,914 tons.

For 15 of the companies listing fourth quarter profits the total reared up to \$189,340,937 against \$157,336,925 for the previous year—a rise of 20.5 pct.

This last-lap output spurt and complementary high demand in the final quarter is a significant clue to what may happen in 1953. With its high-speed start steel output this year may overthrow every record.

Return to Normalcy?—So virile is current demand that steel men expect it to barge into the second 6 months without being appreciably weakened. And they imply that if demand wanes somewhat later this year it could be nothing more than a healthy transition to more normal operations. Many steel people are convinced that the industry can operate just as profitably at a smooth 90 pct of capacity as at a wearing 100 pct.

In reporting the lowest profits since 1948, U. S. Steel Corp. Chairman Benjamin F. Fairless spoke of steel demand holding strong and a backlog of orders steady at 19 weeks.

Well Supported—Mentioning that a few products were weaker than the rest, Eugene G. Grace of Bethlehem Steel Corp. said that "the whole line is pretty well supported." Confident that the civilian economy was thriving, he pointed to Detroit automakers as continuing heavy contributors to steel demand.

From the tone of business reports it's evident that civilian industry is

Steel Company Earnings—1952 and 1951

Company	Fourth Quarter '52	Fourth Quarter '51	1952 12 Months	1951 12 Months
U. S. Steel	\$48,126,916	\$49,626,230	\$144,285,522	\$184,359,787
Bethlehem Steel	49,479,066	39,375,946	90,900,771	106,531,293
Republic Steel	22,853,905	15,695,285	44,274,053	54,921,541
Jones & Laughlin	14,071,000	7,161,000	19,482,000	30,998,000
National Steel	14,778,468	10,807,895	37,559,477	45,287,093
Youngstown	11,864,358	7,095,122	22,915,822	30,644,201
Inland Steel	7,615,464	9,136,736	23,755,218	34,398,585
Wheeling Steel	6,891,748	5,770,652	10,950,780	17,392,959
Sharon Steel	2,661,232	1,444,787	5,000,000	8,861,187
Lukens Steel			2,316,791 ¹	3,549,567 ¹
Colorado Fuel & Iron	2,026,246	1,925,307	5,761,965 ²	10,044,728 ²
Kaiser Steel	1,957,165	3,160,250	3,623,657 ²	5,675,927 ¹
Pittsburgh Steel	2,919,000	1,811,721	5,100,000	7,331,000
Alan Wood Steel	927,943	582,616	2,251,073	2,303,720
Rotary Electric Steel	1,843,064	2,482,974	565,784	328,042
Keystone Steel & Wire	1,325,362	1,260,404	2,506,275 ²	2,378,081 ²

(¹) Year ended Oct. 25

(²) 6 Mo. ended Dec. 31

(³) 6 Mo. ended June 30

Special Report

Continued

making steady progress. Latest report of the National Assn. of Purchasing Agents emphasizes that the country is not enjoying a boom but will get instead a sustained level of business.

Strike Odds Long—Reinforcing hopes for an unbroken year of steel output (except for the sporadic grievance strike) is the steel industry's obligation to renegotiate on June 1 its steelworkers' union contract on a single issue. "For wages only," stressed Mr. Grace. Since such touchy subjects as fringe benefits won't complicate negotiations the odds against a strike lengthen greatly.

Although 1952 was not a high tax year for strike reasons, the industry's need for tax cuts is still urgent. With record shipments in prospect the high taxes now in effect could have a deadlier effect on profits this year.

But calls for tax cuts were missing from annual reports this month. There was an implication that it would be indiscreet to embarrass the Eisenhower Administration by demanding tax cuts until the Truman budget could be pruned. The horse still comes before the cart.

The industry is also biding its time for the end of price controls, but is heartened by outspoken Republican intentions to discontinue them on Apr. 30.

Price Rise?—Will this be the signal for the industry to raise its prices? It's too premature to discuss "if, when, and how much." But the tenor of annual reports from several steel companies indicates the \$5.20 a ton granted by Office of Price Stabilization to cover increased wages last year was inadequate. Both Mr. Fairless and Mr. Grace said that some steel items were under-priced.

This may betray at least a tendency to raise some prices but the overall price trend ranks as more important. Major producers raise prices reluctantly, only under extreme pressure of costs and wages.

At any rate a decision on prices may be influenced by what happens to taxes, other costs, wages and finally what happens to demand.

Improvements—Besides giving the steel industry a little leeway in retiring inefficient facilities when demand relaxes, expansion to 120 million ton capacity this year is also improving product mix and balancing steelmaking to finishing capacity for several producers.

In its annual report Inland Steel says it processed conversion steel supplied by its customers to the tune of 11.3 pct of its shipments in 1953. This, the company promises, will be narrowed down considerably.

Pittsburgh Steel in its report announces a new rolling mill to be completed by the end of the second quarter. This will permit the firm to enter the sheet market and discontinue the need to sell one-third of the ingots it had to produce to keep its primary capacity fully employed.

Out of Pocket—How much tax money has the government lost because of the steel strike? First it must be remembered that Mr. Truman's reckless backing of the union's position encouraged it to start a long strike which was settled later at more or less the same

terms initially offered by the industry.

Not including tax revenue lost by cuts in workers' incomes, transportation and raw materials industries' losses, the declines in tax revenue from the steel industry alone are sheer.

Who Paid What?—In 1951 U. S. Steel paid \$398 million in normal and excess profits tax while for 1952 an estimated \$116 million will be paid.

Other available tax figures are:

	1952	1951
Bethlehem Steel	\$66,000,000	\$162,000,000
Youngstown Sheet & Tube	16,890,000	38,692,000
Inland Steel	13,117,000	53,520,000
Jones & Laughlin	5,858,000	54,339,000

Get It Back—Oddly enough what helped the industry recoup a fraction of its profit losses was recovery of credit on the excess profits tax. Correcting themselves after pegging provisions for this tax on an assumption of very high operations for '52, industry accountants marked up credit kickbacks of many millions. U. S. Steel alone deducted \$15 million in tax credit.

IRON & STEEL: December Output By Districts

As Reported to the American Iron and Steel Institute

DISTRICTS	Number of Companies	Annual Capacity	PIG IRON		SPIEGEL, FERRO-MANGANESE		TOTAL			
			Dec.	Year to Date	Dec.	Year to Date	Dec.	Year to Date	Pct of Capacity	
									Dec.	Year to Date
Eastern	12	13,983,580	1,184,630	11,636,647	27,904	285,959	1,212,534	11,922,606	102.6	85.3
Pitts.-Yngstn.	17	27,468,600	2,392,078	22,740,706	32,144	259,898	2,424,222	23,000,603	104.4	83.7
Cleve.-Detroit	6	7,501,100	687,488	6,478,102			687,488	6,478,102	108.4	86.4
Chicago	7	15,703,740	1,338,187	12,682,741			1,338,187	12,682,741	108.8	80.6
Southern	8	5,648,620	503,508	4,950,051	13,352	84,069	516,860	5,034,720	108.2	79.1
Western	3	3,476,700	330,245	3,040,419			330,245	3,040,419	112.4	87.5
TOTAL	35	73,782,340	6,436,136	61,528,665	73,400	629,926	6,509,536	62,198,691	104.4	84.2

DISTRICTS	Number of Companies	Annual Capacity	TOTAL STEEL (Incl. Alloy Steel, Carbon Ingots)				ALLOY STEEL		CARBON INGOTS	
			Dec.	Year to Date	Pct of Capacity		Dec.	Year to Date	Dec.	Year to Date
					Dec.	Year to Date				
Eastern	23	21,709,870	1,860,444	18,033,736	101.4	83.1	158,345	1,479,364	417,361	3,823,358
Pitts.-Yngstn.	34	42,350,760	3,742,547	36,206,196	104.5	85.5	823,628	5,186,743	479,937	4,396,000
Cleve.-Detroit	8	10,485,380	906,100	9,084,735	102.2	86.6	81,777	762,008	106,301	937,335
Chicago	16	22,258,500	2,097,346	19,485,329	111.5	87.5	191,695	1,485,788	305,149	2,908,255
Southern	11	5,291,260	492,513	4,588,516	110.1	86.7	7,388	72,405	2,246	19,000
Western	12	6,491,900	591,212	5,757,863	107.7	88.7	17,406	122,027	32,090	253,260
TOTAL	82	108,587,670	9,690,162	93,156,375	105.6	85.8	940,239	9,108,335	1,343,094	12,338,568

STRIP: Cars Eat Up Chrome Stainless

More brightwork, high auto output, nickel curbs tighten 430 stocks . . . Mills booked full, plan expansion . . . Brightwork suppliers turn down new orders—By R. D. Raddant.

Take a look at almost any new car. From top to bottom, front to back, it gleams and flashes with brilliant brightwork and trim.

Then take a look at the automotive production rates. At the end of last week 345,100 cars had been turned out so far in 1953. This compares with 215,100 for the period in 1952, an increase of about 50 pct.

Then recall that with nickel restricted entirely from all but functional brightwork, chrome stainless strip has been substituted for much plated steel.

Getting Tight—Put these three factors together and this is the inevitable result: Chrome stainless strip, 430, once so plentiful that it escaped government control, is now getting as tight as some products that have always been considered scarce.

"We are already sold out through May and June and are 4 to 6 weeks behind on delivery," one mill source declared. "Last year at this time we had 10 to 12 pct less production and were booked less than 6 weeks ahead."

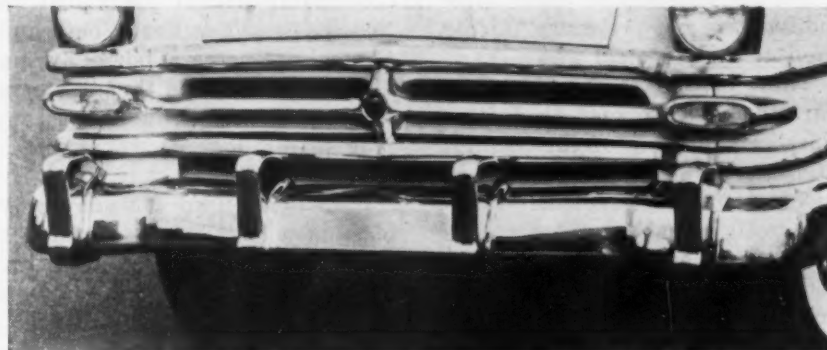
"We are running at maximum capacity and I'm sure we could sell twice as much," reported a spokesman for another chrome stainless source.

"The market is considerably stronger this year. I would say it's approaching the point of being twice as strong as a year ago," said a third steel spokesman.

Refusing Orders — Statements from users of chrome stainless strip bear out the same contention. Consumers are not just the auto manufacturers, but trim and brightwork suppliers who constitute a sizable industry in themselves. None of those contacted had yet been forced to cut production because of a stainless short-

age, but several reported they had to turn down business.

Specific product referred to is stainless steel strip 430. It contains from 14 to 18 pct chrome and many automotive purchasers write at least 16 pct into their specifications. Research and experience



COMING AT YOU: A sample of automotive brightwork.

have shown that if more chrome is added, trouble in forming is likely —with less corrosion troubles.

How Much? — Just how much stainless is used on the average car is difficult to estimate. It is considered a competitive secret by the auto companies and it varies within companies and models. A well-informed estimate is from 35 to 40 lb on one deluxe model. This represents an increase of as high as 34 pct in one company from 1952. On another make, a heavy stainless user in the first place, probably only 3 lb more are used.

This view isn't unanimous by any means, but a strong demand for chrome stainless is now believed to be permanent. Even the return of an abundance of nickel would not cut the demand as much as might be believed.

Capacity Expanding—As a result, there is an increase coming up in stainless strip capacity. A major supplier who provides as much as 40 pct of the needs of one

of the Big Three has an expansion program under way. A second is doing considerable research in Detroit to find out if the market will continue strong enough to warrant expansion.

The 430 strip is now found on grilles, around headlamp body molding, window molding, stone shields, tail light trim, air shields, and on almost every bright part not die-cast or functional.

Rust Resistant—It can be buffed up to match other chrome plating and is very resistant to rust. In

fact, 430 forms a protective oxide film that is a protection against corrosion, but this turns slightly yellow in time. A chrome flash can be applied to retain the luster and this is done on many cars. There are many exceptions to this rule of thumb, but generally the flash is applied to more expensive cars.

In cost chrome stainless has some advantages. It is cheaper than the copper-chrome-enamel brightwork that has been substituted for the reliable copper-chrome-nickel brightwork, but costs about the same as the latter.

New Trend—Probably the biggest threat to the market for this product is the fickle nature of the public. The trend for a number of years has been toward more brightwork, but this could reverse.

Some of the most ultra-exclusive, experimental and sports models have shown a tendency to minimize the body brightwork in the interest of clean body lines. Whether this is a trend or a straw in the wind is anybody's guess.

DIESELS: Take Over the Rails

Switch to diesel will take 5 to 8 years . . . Builders look for replacement business, foreign markets . . . Dollar exchange, nationalized roads slow exports—By K. W. Bennett.

Dieselization of the nation's railroads will have been completed in 5 to 8 years. The sweeping drive that forced the old steam locomotive from the rails and replaced it with the swift and relatively silent diesel-electric will have come to an end.

Yet the builders of diesel locomotives are not preparing to fold their tents and steal away.

They expect the replacement parts business to keep production lines moving. One of the handful of large builders has stated that in 7 years replacement dollar volume will equal new locomotive production in 1948. In that year 2661 locomotives and units were ordered from the industry.

Peak year was 1950 when 4381 locomotives and units were ordered, and the figure has been falling off since. Steel shortages, and strikes, have been a contributing factor to this decrease.

Seek Export Trade — Foreign markets are every diesel-electric locomotive builder's pie. Foreign sales staffs are being strengthened

and an increasing percentage of output is aimed at foreign railroads. While still feeling their way, builders will be hitting a strong competitive stride by mid-1954, will be giving English and German builders a rough run in the foreign market.

Probable hottest spots will be the Near and Far East. South and Central America, now buying diesel-electrics even though steam locomotives are available at scrap-pricing prices, look good.

Stumblers—Two difficult problems must be overcome in foreign selling, and they apply to many other industries as well: (1) Dollar exchange is difficult in countries where the monetary unit has low exchange value, and (2) with the majority of foreign roads government owned, the strategic value of locally produced coal or electricity is a prime consideration to the potential buyer.

Builders in this country are using several plans to market their products abroad. Direct sales outlets will be used to place locomotives

on order for shipment and completed units from the U.S. This is already being done. Or a foreign manufacturer will be licensed to build the locomotives from parts manufactured in the United States. This is also being done, and both plans will be expanded.

Advantage for the second is that it removes the "foreign" stigma from American equipment, retains a portion of the cost of the completed locomotive in the nation making the purchase.

New markets must be opened, whatever plan is employed. Since the turning point in 1938, when 160 diesel-electric locomotives and units were placed on order and 36 steam locomotives were ordered, diesel-electrics rose to the peak of 4381 locomotives and units ordered in 1950, as opposed to 54 steam locomotives.

More for Money — And the diesel-electric has been consistently a better buy. Dollarwise, cost per horsepower has actually held even. To compare average tractive effort in two engine classifications:

1940, first 6 months	Freight	Switch
Diesel-electric . . .	20,925 lb	53,701 lb
Steam	57,313	20,925
Jan. 1, 1951		
Diesel-electric . . .	133,380 lb	57,794 lb
Steam	63,299	45,930
Dec. 1, 1952		
Diesel-electric . . .	119,367 lb	58,991 lb
Steam	65,597	47,051

The current market, while slower than 1950, is moving strongly. In 1952 the railroads put 2389 new diesel locomotives in service. (Including units, the total was 3038). Other new units installed included 19 steam locomotives, one electric, and six gas turbine-electrics.

As of Jan. 1, 1953, railroads had placed on order 788 diesel locomotives with 914 units; 15 steam locomotives, 10 electrics, and 19 gas turbine-electrics. The gas turbine-electric appears to be moving up without serving the long switch-yard apprenticeship of the diesel-electric. Electric reached its peak in 1941, appears to be on a replacement basis at present.

Growth of the Diesel-Electric

Owned or Leased	Aggregate Tractive Effort (in lb)	Stored Serviceable Locomotives
Dec. 1, 1930		
All Locomotives 55,985	2,537,865,943	8,642
Jan. 1940		
Steam 41,032	2,078,833,202	2,082
Diesel Electric 544	29,880,323	44 (electric and others)
Electric 770	47,969,195	
Dec. 1, 1951		
Steam 21,857	1,280,362,000	1599
Diesel Electric 12,150 (or 17,381 units)	1,014,506,000	2 (2 units)
Electric 691 (or 780 units)	45,530,000	13 (13 units)
Dec. 1, 1952		
Steam 16,231	975,359,000	1522
Diesel Electric 14,496 (20,414 units)	1,205,340,000	0
Electric 672 (762 units)	44,877,000	12 (15 units)

NEW PRODUCTS: Odds Are You Fail

Most manufacturers are planning to bring out new products, but eight out of ten will flop . . . New survey tells why . . . Pricing, market shifts need more study—By E. C. Kellogg.

Most businessmen wouldn't knowingly play a 50 to 1 shot, but they do every time they bring out a new product. If their firm is a leader in its field, has trade and consumer acceptance, and enough money to blot up a steady flow of red ink, the odds are still an uneasy 5 to 1 that the product won't be successful.

Booby-traps of new product marketing were pointed up in a recent survey of the packaged goods industry made by Hilton & Riggio, New York advertising agency. Though most of the firms questioned are in the food, drug, or soft drink business, some of their marketing problems are generally similar to those in metalworking.

Top Firms Flop—Believed to be the only study of its kind ever made, the survey showed that of all postwar new products put on the market by 200 leading packaged goods manufacturers, only 19 pct were successful. These findings are further backed up by a U. S. Dept. of Commerce estimate that 90 pct of all new products fail within 4 years.

There are no figures available on how much money manufacturers waste each year trying to inflate new product balloons that never take off. It undoubtedly runs to hundreds of millions of dollars. Add to this the millions wasted on products that never leave the drawing boards.

Why They Failed—More important are the reasons for the high rate of new product flops. In the Hilton & Riggio survey, manufacturers listed "lack of a well thought out marketing program" as the main cause.

In most cases, manufacturers were overly anxious to get their products on the market and to build up volume. They didn't give enough consideration to problems such as

whether their product should be marketed through company branches, factory representatives, jobbers, department stores or drug stores.

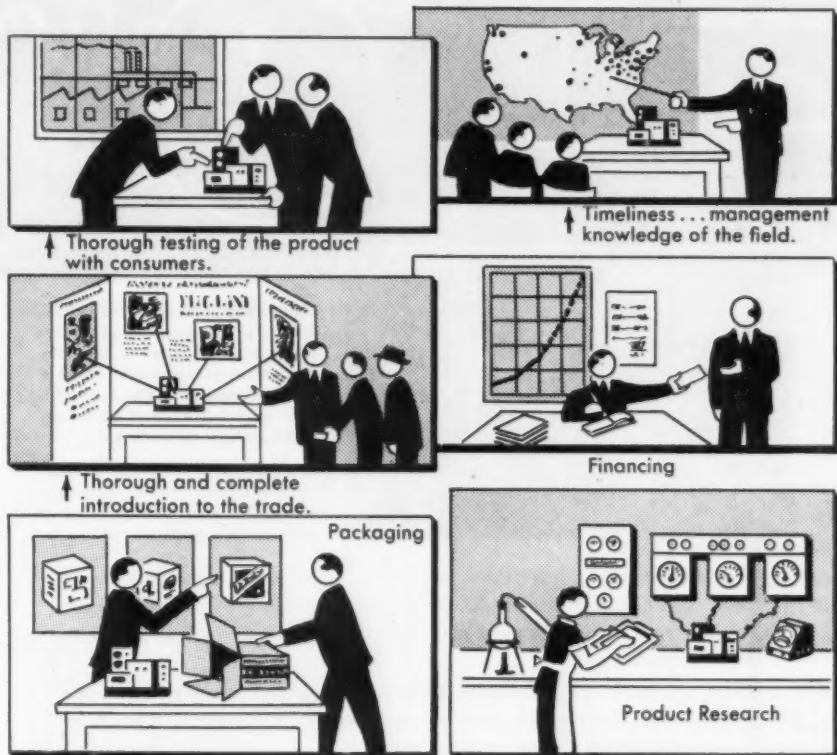
Lack of pretesting with consumers was rated second most important trouble spot. Next in line were failure to make market tests,

the manufacturers surveyed found that it cost more than anticipated to introduce a new product and 70 pct said it took longer.

Despite all these statistics, 84 pct of the firms surveyed are planning to bring out new products soon. And 76 pct believe the market will be better during the next 3 years.

Get an Expert—Peter Hilton, president of Hilton & Riggio, told THE IRON AGE that he considers pricing research one of the most important factors in new product marketing. He said few manufac-

What New Products Need



insufficient product research and lack of package pretesting.

Testing new products with consumers was rated the most important consideration in trying to put over a new product (see box).

It Costs More—In addition to showing that four out of five new product ventures pancake, the survey also indicates that new product marketing is a more painful process than expected even when the item is a success. Around 77 pct of

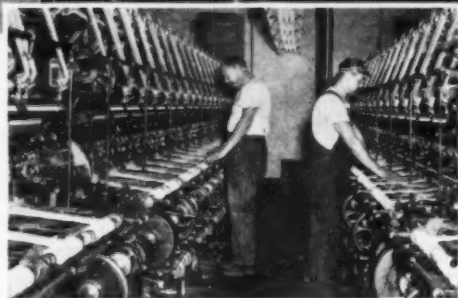
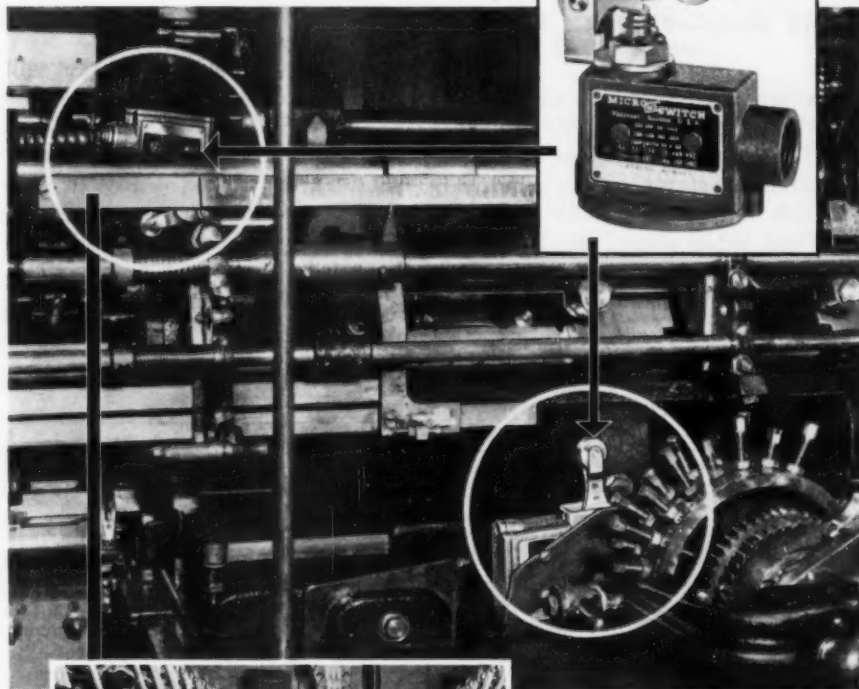
turers understand pricing and suggested that they rely on market tests and the advice of pricing experts.

In completely new fields where there is no competition, Mr. Hilton said intelligent pricing is even more important, because it is possible for a manufacturer to keep out new competition by setting a low price.

Who Buys Where?—Manufacturers should also watch closely for changes in marketing practices.

"Since installing these two MICRO switches we have had no record of needle breakage"

Says L. H. Prinz, Plant Engineer,
Skyland Hosiery Mill, Asheville, N. C.



Close-up view of the two MICRO switches installed on the carrier rack at the Skyland Hosiery Mill, Asheville, N. C. The switch at the upper left cuts off current in case of misadjustment of the carriage. The lower switch shuts off power if narrowing fingers endanger the needle bed.

View of portion of the Skyland Mill showing plant equipment that has been made safer and more automatic by the use of MICRO precision switches.

● Not only have these MICRO switches prevented needle breakage but, according to Mr. Prinz, they have also reduced the danger of jams on the carrier rack that can cost from \$500 to \$2000 to repair.

Skyland's engineer installed one switch on the carrier rack in such a way that it stops the machinery at once in the event of any misadjustment or mechanical failure on the part of the carriage. The other switch acts to stop the machinery if the narrowing fingers approach each other so closely as to tear up the needle bed.

Plant engineers in every industry are daily finding more and more uses for MICRO switches as limits, safeties and interlocks to make existing equipment more automatic and more productive.

There is a MICRO authorized distributor located near you with a wide variety of MICRO precision switches from which to select the switches best suited to your equipment needs. Micro engineering service is also available at nearby branch offices to help you solve your switch problems.

MICRO
MAKERS OF PRECISION SWITCHES

FREEPORT, ILLINOIS

A DIVISION OF
MINNEAPOLIS-HONEYWELL REGULATOR COMPANY



Marketing

For example, the agency head said that 5 years ago grocery stores accounted for only 4 pct of the nation's cigarette sales. Today, 46 pct of all cigarettes are purchased over grocery counters.

Another reason manufacturers need up-to-date marketing data is to keep tabs on buying habits and product preferences. Tastes vary in different parts of the country. New Yorkers swill more club soda (54.4 pct) than all the rest of the U. S., while residents of Cuyahoga County, Ohio, consume more liquor than any one of 25 states.

Mr. Hilton warned that manufacturers trying to market new products "were playing with the dice loaded against them, but the profits of success are worth the heartaches and the risk."

FORECAST:

High business turnover predicted for first 6 months of this year.

A high business turnover for at least the first 6 months of 1953 was predicted by U. S. Steel Supply Co. President L. B. Worthington last week. Mr. Worthington spoke at Milwaukee under the auspices of the Wisconsin chapter of American Steel Warehouse Assn.

Warehouses are continuing to have difficulty in reaching normal inventory levels, Mr. Worthington said. He indicated that present warehouse steel stocks are at little better than 50 pct of pre-Korea levels. Heavy hot-rolled and cold-finished rounds over 2 in. in diameter and heavy plates are giving the most trouble.

Cold Sheets Uncomfortable
Milwaukee warehousemen reported that cold rolled sheet has been extremely tight as well, and rarely remains in the warehouse more than 24 hr. Warehouses stocking aluminum reported similar difficulty in keeping a variety of sizes.

Explaining the slow recovery of warehouse inventories despite a 120 pct allotment of steel during latter 1952, warehousemen indicated it had been necessary to take odd lots of steel, off sizes, and seconds, to approach the 120 pct limit.

STEEL: What Kinds of Capacity?

DPA-NPA expansion progress report easily misconstrued . . . Industry not slighting defense needs for civilian item capacity . . . Finishing facilities convertible—By J. B. Delaney.

An old booby trap has claimed some new victims.

The trap was sprung in a familiar way through misinterpretation of a Defense Production Administration and National Production Authority progress report on expansion of the steel industry to meet defense and civilian needs.

These interpretations gave the impression, in some quarters, that the steel industry is feathering its civilian markets nest at the expense of defense needs while taking advantage of tax concessions.

Flexibility Missed—The industry says these evaluations overlook several facts. One of them is the flexibility of steel finishing capacity. A strip-sheet mill producing for civilian consumption today can be converted quickly to production of plate for defense tomorrow. Shell steel may be rolled on structural and rail mills. If the situation should warrant, even blooming mills could be utilized for shell steel production.

The report itself recognized that "the finishing end of the iron and steel industry is characterized by considerable flexibility and convertibility in many product areas."

Civilians Not Forgotten — Another point brought out by DPA-NPA is that the problem laid before the steel industry after outbreak of war in Korea was not only to expand basic capacity to meet the needs of military and defense supporting industrial production but also to provide "for the needs of our expanding civilian economy."

The DPA-NPA report covers the first phase of a three-part study to determine ability of the industry to meet full mobilization demands for eight critical products. Report No. 1 covers maxi-

mum potential output of the eight products. Later reports will deal with military and other requirements for these products in a period of full mobilization, and finally evaluation of the data on output potential and requirements.

A final judgment is not possible until the three reports are in.

Upped 25 Pct—The report indicates that steel ingot capacity will stand at 124 million tons on or about Jan. 1, 1954 if all planned expansions are completed. This is an increase of 25 pct over capacity of 99.3 million tons at Jan. 1, 1950. Blast furnace capacity is expected to reach 84.9 million tons compared with 71.5 million tons on Jan. 1, 1950, an increase of 19 pct.

Steel executives who have studied the initial report find nothing in it that is critical of the steel industry. Neither do they see any

reason why the industry should be taken to task.

Steel's Position—Given the steel to work with, the mills can come up with any product mix required for a defense or a civilian economy. That's the reason for the emphasis on new iron and steel-making capacity, raw materials, and transportation facilities.

Of the \$4.6 billion covered by certificates of necessity granted up to last Oct. 1, 72.9 pct of the amount certified and 77.8 pct of the amount amortizable were for facilities involving expansion in these phases of steel production.

Government and industry are in agreement on the necessity of expanding steelmaking capacity. Lack of steel not finishing facilities hit hard in World War II.

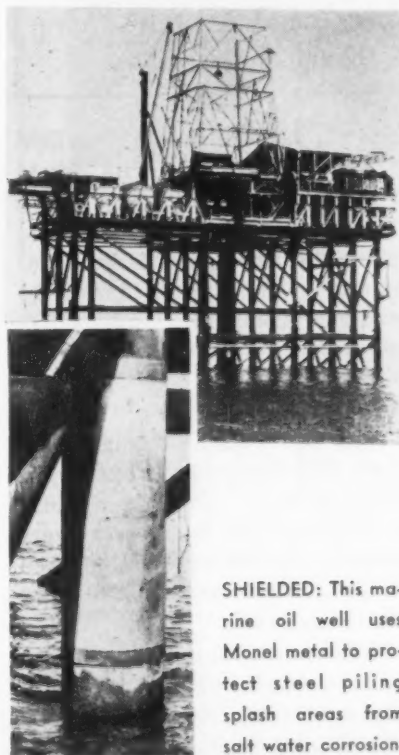
Finishing Never Short—The industry's point is that it's more important to have steel available to work into finished products than it is to have finishing facilities and no steel to work with. Finishing facilities can always be modified to meet requirements. The industry's finishing capacity has historically been greater than its steel melting capacity.

Steel producers believe it makes good sense to plan with both civilian and defense needs in mind. They point out that if the facilities for defense requirements are to be available when needed these same facilities must also be useable for civilian production. Otherwise the equipment deteriorates in idleness. Also, the industry can see nothing wrong in a policy of installing equipment that earns its keep in both peace and war.

Steel Lack Feared at CMP's End

Manufacturers of water treatment equipment last week opposed discard of CMP.

According to members of the industry advisory committee to National Production Authority, a number of producers are meeting with trouble in getting on-time steel deliveries. They fear that if CMP were suddenly to end, they would be lost in the scramble for steel.



SHIELDED: This marine oil well uses Monel metal to protect steel piling splash areas from salt water corrosion.

SMALL FIRMS: Health Still Good

U. S. Chamber of Commerce study finds business concentration declining . . . Big business not squeezing small firms out of marketplace . . . Many problems common to all sizes.

What's with small business? Is the push for low cost efficiency knocking it out of the marketplace? Will it be gobbled up by massive corporations seeking further expansion and diversification?

Emphatically not, says U. S. Chamber of Commerce in a new study, *Small Business: Its Role and*

70 pct were individually owned, 18 pct partnerships, and about 11 pct corporations.

Few Large Firms—Taking \$5 million as the dividing line, the survey finds that in 1949, only 9590 corporations qualified as large out of a total of just under 4 million. Broken down by size, nearly 58 pct

finds that the vast majority of failures failed by themselves, without any outside help. According to one sampling, nearly 9 out of 10 failed through inefficient or incompetent management. And most firms fail in the first 5 years, before they could become a serious threat to big business.

Rather than being antagonistic, the survey finds that small and big business are complementary, and usually go hand in hand. Subcontracting is just one illustration of this reciprocal relationship. Big business is just too big and too diversified in its needs to attempt to own facilities to make everything it needs.

Is Bigness Bad?

Bigness in business is a real asset to the American economy, a new American Institute of Management report shows. Size is the result of good management, not monopolistic practices, the study finds, and this management tends to preserve itself, attracting and generating high-caliber managerial talent.

This quality of management personnel is necessary to mass production and distribution, with the resulting benefits of low costs to the corporation and low price to the consumer.

Separate divisions within an organization must justify their existence by profits consistent with those of other divisions. This results in competition, both internal and external competition—internally between divisions to make the best showing, and externally with other companies in the same field. Results of this striving for better operation are passed on to all sections of the economy.

Its Problems. The study finds small business in good health, an essential part of our economy, and necessary to the life of the big corporations which it complements in many important ways such as subcontracting.

Everybody's Got Troubles—The chamber doesn't deny that small business has problems, but points out that many are common to all business. And some of the others are inherent in the nature of small firms.

Contrary to popular mythology, concentration in American business is declining today. Almost three-fourths of all firms in 1947 had less than four employees, and only 5 pct had 20 or more. Nearly

of total corporate assets were held by 1179 corporations with assets of \$50 million each.

But even small firms can build up, in the aggregate, large accumulations of capital. Assets of very small companies, under \$250,000 apiece, totaled almost \$29 million.

High Death Rate—Casualties of small firms are high: From July 1, 1951, to Mar. 1, 1952, a total of 296,600 new businesses were started; 316,300 were transferred to new owners; and 266,200 went out of business.

Marxists would point to this as an example of how bad big business gobbles up good little firms. But the Chamber of Commerce

Need Money—One real problem for small business is obtaining sufficient capitalization. Bank credit is generally available to small firms as it is to larger ones. But taxation has cut down the funds available for investment, particularly in more speculative ventures.

All business is handicapped by this shortage of equity capital, but smaller firms with shorter financial histories, less earning potential, and higher mortality are obviously less attractive to the investor.

Out of Control—Many of the limiting factors on a company's size are beyond its control. Some kinds of business can economically serve a small area; others must have a wider market for sound operation.

Technological considerations play a vital role. With blast furnaces at several million dollars a copy, iron and steel producers must have large plants and markets. But even at the present high price of beef, cows and other equipment necessary to cheesemaking are relatively cheap and easy to come by. A community rather than a broad industrial area is a sufficient marketplace.

The study points out that while special aid to small business is available and needed, the best help is to maintain conditions

favorable to business in general. Small business is a vital part of the American economy: its health depends on the health of the whole economy.

And small business does have certain competitive advantages. Its executives are closer to the point of sale, have more direct access to consumer viewpoint, and generally run a more flexible operation. More intimate contact with employees tends for smoother labor relations, in addition.

PROFITS:

Big business slice of national income melon gets less and less.

Big business has been receiving a diminishing share of the national income since 1929, says Dr. A. D. H. Kaplan of the Brookings Institute.

Speaking last week in New York at a preview session of a 5-year Brookings study of large corporations, Dr. Kaplan showed how small and medium sized companies have been getting an increasingly large slice of the profit melon.

Taxes Hurt—From 1929 to 1948, he said, national income nearly tripled. Corporations produced about half, unincorporated firms about one-third, and the government the remainder. Corporate profits rose from 11.5 pct to 13.8 pct before taxes, but Uncle Sam's bite pushed profit after taxes down from 10 pct to 8 pct.

Profits before taxes of the 100 largest industrial firms fell from 3.7 pct to 3.3 pct of the national income. Other large corporations found their profits down from 2.4 pct to 2.0 pct. But profits of medium sized companies rose from 4.8 to 7 pct. Small firm earnings went from 0.6 pct to 1.5 pct.

Slippery At Top—Another phase of the study covered stability of large firms. Dr. Kaplan found profound changes in both the industries and the companies represented by the 100 top corporations.

"The top is a slippery place," he commented.

Iron and steel dominated big business in 1909. But its share of the total assets of the top 100 has skidded from 30 pct to 11 pct. Transportation equipment and petroleum skyrocketed from then to the present day. Private transport and leather dropped completely off the list. Coal mining stayed on, but dipped to last place.

Small Business Items Earmarked

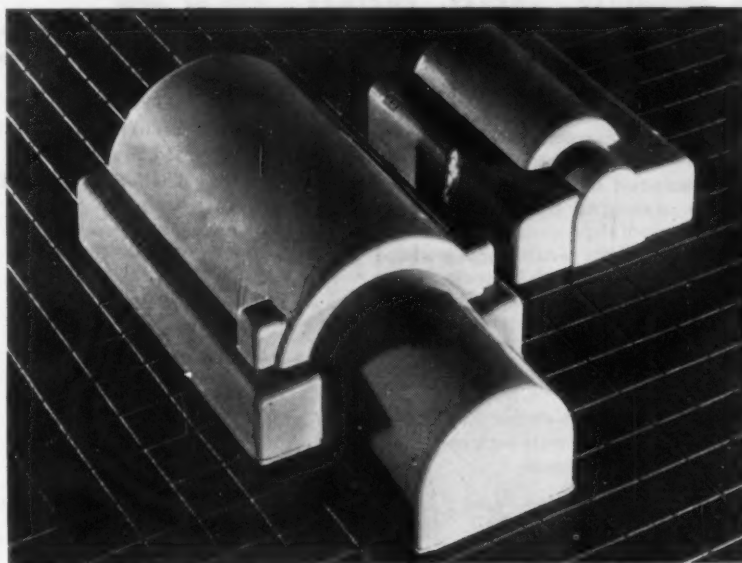
Metal hospital furniture, plugs for cartridge cases, and various kinds of tools are among industrial

products which the military departments are expected to buy from small companies under the joint contract determination program.

These items have been labeled for small-business handling, but no contracts have yet been let, Small Defense Plants Administration says.

The agency reports that the value of proposed military procurements earmarked exclusively for small firms now is over the \$250 million mark. Substantially lower, and amounting to about \$60 million, is the total in contracts actually awarded to companies in this category.

Power



Supercharging Cuts Generator Size

Steam turbine generator size will be drastically cut by complete supercharging in a new unit now being built by Allis-Chalmers Manufacturing Co.

In the newly-developed machine, cooled hydrogen is forced at high velocity through the conductors of both stator and rotor. Photo shows scale model of the unit (right) with a model of a standard hydrogen cooled machine of the same rating. Size reduction is made possible by increased cooling ability of the new design. Exciter size has also been cut by a new excitation system.

Supercharged cooling was used in the rotor of a 60,000-kw Allis-Chalmers generator installed in 1951. But this is believed to be the first time both stator and rotor have been supercharged.

The new machine is being built for development and test purposes. Nominal rating will be 40,000 kw, with 60,000 kw at higher hydrogen pressure.

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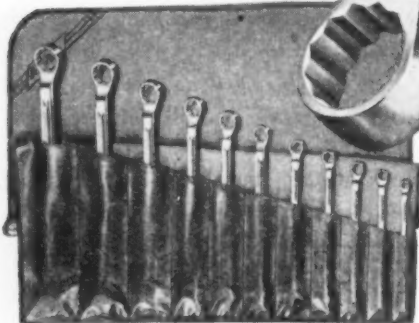
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XV-611-K OFFSET BOXOCKET SET—Consists of 11 wrenches, range $\frac{3}{8}$ " to $1\frac{1}{4}$ ", in handy kit bag. Provides 22 wrench sizes with six popular sizes duplicated.



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Management

MERGER: Dec

**Doehler-Jarvis stockholders to
decide Feb. 6 . . . Hinges on a
number of different points.**

A decision must soon be made by stockholders of the Doehler-Jarvis Corp. They must decide whether or not their firm is to become a division of National Lead Co. And the choice hinges on some seemingly sticky factors.

Since the move is in the nature of an acquisition rather than a merger, the stockholders of National Lead will not have to vote on it. A meeting of Doehler-Jarvis stockholders, originally scheduled for Jan. 30, will be held tomorrow, Feb. 6, at Grand Rapids, Mich. Intentions must be declared within 20 days after the meeting.

If the answer is "yes," 1.15 shares of National Lead common stock will be handed over for each share of Doehler-Jarvis common. This is very close to the ratio of the two on the New York Stock Exchange.

Financial Picture — Sales volume for National Lead in 1951 was just shy of the \$390 million mark. Earnings for the year totaled almost \$23 million, equal to \$2.05 per share of common stock. Dividends per share were \$1.41 $\frac{2}{3}$. In comparison, Doehler-Jarvis sales in 1951 were not quite \$86 million and total earnings were \$5.5 million. But on a per share basis the earnings were \$5.16 and dividends were \$2.50. In 1952 Doehler-Jarvis dividends were \$1.75 per share and National Lead's were \$1.45.

But the die-casting industry, of which Doehler-Jarvis is the largest member, is subject to many ups and downs while National Lead is a definitely growing concern. In a study covering 50 years on the New York Stock Exchange, National Lead was second in this growth.

Versatile Firm — National Lead is the largest producer of materials using lead and tin in the country. It's a well diversified company, supplying paint and chemicals as well as metals and metal products. It

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Which Way to Jump?

recently went in to the titanium business and is also now producing a plastic die material. The company has a long record and fine reputation for excellent management.

The two companies are relatively non-competitive and neither is a major supplier of materials to the other. As far as their customers are concerned, there would be little change in business relationships except that sales outlets would probably handle a more diverse line of products.

By merging interests, the two companies would combine management and eliminate much duplication of action, which might mean better management efficiency. This would also be true of research departments since there is some overlapping of scientific endeavor between the two. Sales and distribution setups would become more effective by the same token.

Short or Long?—These are the considerations Doehler-Jarvis stockholders must take into account. Each must ponder on whether or not he is interested in the long-range picture or the short-term outlook for profits on his own investment.

The individual must ask himself which is more valuable, good earnings and dividends now with the possibility of a business drop in the future or part ownership in a much larger, more diversified, growing concern with lower, but steadier earnings and dividends.



"It got to be plastics this and plastics that until I got sick of the whole thing."

February 5, 1953

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BILLETS AND FORGINGS FOR PRODUCTION, TOOL ROOM AND MAINTENANCE REQUIREMENTS

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TOOLS: Are Builders Asking Too Much?

British productivity team believes tools are overpriced both in U. S. and England . . . Feast-famine market is one of the results . . . Standardization is key to lower prices.

After a recent tour of American machine tool plants, Britain's metalworking productivity team has leveled a number of broadsides at the machine tool industries in both countries. Severest criticism was of the high price of machine tools both here and in England.

The group found little difference between the two tool industries and was far from satisfied with its findings.

Costs Too Much — High price tags were blamed for forcing the machine tool market into its feast-famine cycles. The team pointed out that, though manufacturers have to buy tools to stay in production, they hold off on replacements for an unduly long time because it costs too much to purchase new tools.

Solution to the price problem is increased production, the group indicated. And standardization of parts was singled out as the best way to boost output (see page 119).

By standardization the productivity group does not mean merely making a few interchangeable parts for different machines. Some

members believe basic changes must be made in machine tool design so that many types of machines, both standard units and specials can be made from a common stock of standard parts.

Dim the Shine—The group also suggested that prices could be lowered, if tool manufacturers put less emphasis on window-dressing. Spit and polish consumes man-hours that could be used in production, and it also raises costs which are passed along to the buyer. Users will have to be re-educated to give more consideration to function rather than finish.

Too much accuracy was listed as another factor raising the prices of machine tools unnecessarily. The productivity team found that many machines, particularly those made in England, are capable of doing much more accurate work than they would ever be required to do. It was suggested that more use be made of recognized standard tolerance systems.

Does It Pay? — American machine tool firms were reported to put much greater emphasis on ma-

terials handling equipment. Although this gives U. S. manufacturers an advantage in production the survey group questioned whether this advantage justified the cost in every case. However, it was recommended that British manufacturers install more electric job cranes to speed work.

Machining and fitting methods on similar types of machine production were judged about the same in both countries. But U. S. toolmakers held an edge in servicing their production equipment and as a result got more output.

Change Layout — Final suggestion of the productivity group was on plant layout. Most plants in both countries favor grouping production equipment by types, but it was suggested that straight-line machine layouts would reduce materials handling.

Spain Gets Steel Loan

A \$6,000,000 credit for the expansion of the Spanish steel industry is the main single item of a \$62,500,000 loan to Spain, authorized more than a year ago but only recently completed as to allocations.

Credit is being extended by the Export-Import Bank, as agent for the Mutual Security Agency. All credits are guaranteed by the Spanish government.

This does not include an additional \$125,000,000 which Congress has authorized, use of which is up to discretion of the White House, for military, economic, and technical assistance to Spain.

British Steel Ahead of Schedule

British steel production is expected to hit 19.6 million tons in 1953. This estimate, made by the British Iron & Steel Federation, is 280,000 tons more than was originally planned.

The Federation states that output from almost all steel producing areas in England are ahead of previous expectations. Largest increase has been in South Wales where the Steel Co. of Wales' new plants are now nearing capacity production.



NON-METALLIC: This three-seater German Lloyd shown at the Brussels auto show has wood coachwork covered with imitation leather. Probably dents in fenders must be sewn up.

STEEL: Second Quarter Quotas Bigger

Most hard goods producers will get 90 pct steel ration . . . May get supplementary allotment . . . Autos slated for special treatment . . . Aluminum, copper unchanged at 55 and 50 pct.

Manufacturers of most types of consumer hard goods are scheduled to get a better break during second quarter than at any time since imposition of the Controlled Materials Plan.

In view of the increasing supplies of steel, National Production Authority has raised its proposed carbon steel allotment levels for the second quarter from 70 pct originally scheduled in December. The new figure will be 90 pct of base period.

Copper and aluminum allocations for the present are being frozen at the first quarter levels of 50 and 55 pct respectively.

Alloy at 100 pct—However, alloy steel will be allocated for the second quarter at 100 pct of base period consumption.

There was indication that perhaps an even higher level of allotments could be made at a later date in the form of supplementary allocations to consumers.

Acting director H. B. McCoy said the new allocation level reflects "not only rapid improvement in steel supplies but the growing ability to satisfy both defense and non-defense requirements."

He added that the steel to meet the boosted allocations for consumer hard goods is already available in the NPA general reserve. But it looks, he said, as if the 90 pct level could be met without much, if any, drain on stocks now in the general reserve.

May Get More—This is taken to mean some supplementary allocations might be possible later, which was the practice through last half 1952.

Of about 100 product codes administered by NPA's consumer Durables Div., about 75 are covered by the 90-50-55 allotments. Steel allotments to the remainder

vary but tended to be higher except where an increase in steel would also make necessary an increase in copper or aluminum.

Continued supply difficulties made it necessary to retain first quarter levels for copper and aluminum. Even so, it was pointed out, copper use is generally 20 pct higher than for second quarter 1952.

Will Improve—Some relief for aluminum users was seen late in the first half. Expected restoration of more power, plus initial production of new facilities, is counted on to reduce aluminum order backlogs from the current 65,000 tons to perhaps 55,000 tons by the end of March.

Cooking equipment was the biggest category to receive the 90 pct allotment. Also included were manufacturers of major appliances such as refrigerators and washing machines. Heating stoves, commercial food products equip-

ment, and such items were also hiked to 90 pct of the base period.

Makers of stamped ash and garbage cans and other stamped containers are to get 100 pct of base period consumption, as are manufacturers of domestic cooking stoves and gas conversion heater producers.

Producers of baby carriages, strollers and walkers are to get 100 pct of steel and 100 pct of aluminum—but no copper.

No provision was made at this time for increasing allotments to manufacturers of motor vehicles—which are not included in the consumer durable codes—nor for television and radio sets, which are so considered. Both will get individual treatment shortly.

STAINLESS:

NPA studies industry recommendations on control relaxation.

National Production Authority last week was considering the naming of an industry task group to study and make recommendations regarding relaxation, possibly revocation of controls over stainless steel now in effect.

Such a proposal was put forth by the stainless steel industry advisory committee. Members agree that some sort of priority system must be provided to assure adequate supplies for military and atomic energy facilities programs.

They insisted, however, that considerable study should be given to civilian needs, particularly with respect to nickel-bearing stainless.

Skip Survey—At the same time, NPA officials revealed that the agency had just about dropped plans for making a new survey of electric furnace stainless ingot capacity and rolling facilities with an eye to estimates of full mobilization requirements. No action is planned.

Industry was also asked to try out further production of a new type stainless to be made of chromium manganese with a low percentage of nickel. Some experimentation has been made along these lines, it was said, but more



"It's a deal. You take over his work in the morning."

work is needed to perfect the process.

Columbium Sources—Meanwhile, the U. S. Geological Survey has reported two potential new sources of columbium needed for stainless steel and alloys in connection with jet engine manufacture.

One is in recovery from current waste materials from the processing of Arkansas bauxites. The second source is found in titanium minerals from deposits of specific types.

Preliminary research indicates that if the columbium content of Arkansas bauxite that is processed annually could be recovered, the amount of columbium thus produced would amount to about 80 pct of the amount which must now be imported.

Industry Controls This Week

Autos—Amend. 6, Rev. 1, CPR 1 permits passenger car manufacturers figuring conversion steel adjustments to include the extra cost of conversion steel furnished to their parts suppliers. Several other less important changes are also made.

Boilers—Amend. 4, GOR 42, Revoc., SR 19, CPR 22, Amend. 10, GOR 35 authorize a 5 pct ceiling price increase for manufacturers of cast iron boilers and radiators but prohibit pass through increases under GOR 35 or SR 35, CPR 22.

Brass, Copper—OPS has stated that producers of brass mill and copper wire mill products will not be required to recalculate ceiling price adjustments covering costs of foreign copper before Apr. 30, 1953. Amend. 11, SR 7, CPR 22 permits copper chemicals manufacturers using primary copper to raise ceiling prices 3.84¢ per lb of primary metal contained.

Government Property—Rev. 1, SR 72, GCPR suspends controls on all sales of federal property not bought or produced for resale or stockpiling and not covered by any pricing or supplementary order except SR 72, GCPR.

Latex—Rev. 1, GOR 3 suspends controls on sales of latex foam sponge rubber cushions made for buses and topper pads used for auto seats.

Machinery—Amend. 5, SR 4 and Amend. 4, SR 8, CPR 30 give machinery manufacturers until Feb. 28 to refile for Capehart-type price adjustments. Amend. 2, GOR 42 permits

manufacturers of machinery, related manufactured goods and building materials to include the following in their adjustment period ceiling prices: Capehart adjustments, authorized under GOR 10 and those granted under GOR 29. However, outbound transportation cost adjustments may not be included unless specifically authorized. Amend. 3, GOR 42, Amend. 9, GOR 35 grant manufacturers of electrically operated underground coal mining machinery and equipment a 7 pct ceiling price increase but prohibit further increases under GOR 35.

Nails—Amend. 32, GOR 9 removes price controls from sales of cut tacks and small cut nails. Not included in the exemptions are wire tacks, wire nails or wire staples.

Rails—CPR 186 establishes ceiling prices on sales of relaying rail and used track accessories.

Scales—GOR 42 provides at least one additional price increase for manufacturers of industrial scales and balances, their attachments and repair parts.

Defense Contracts

Contracts Reported Last Week

Including description, quantity, dollar values, contractor and address. Italics indicate small business representatives.

Modification kits, 6970, \$214,118, Wisconsin Motor Corp., Milwaukee.
Primer, percussion, 391500, \$190,351, Harper Wyman Co., Chicago.
Fuze, PD, \$360,050, Dole Valve Co., Chicago.

Fuze, PD, 70000, \$68,544, McGraw Elec. Co., Elgin, Ill.
Inspection gages for 155 MM Howitzer, 14, \$48,150, Perfex Gage & Tool, Mt. Clemens, Mich.

Parts for 60 MM mortar, 18002, \$57,757, Bychlik Engr., Co., Inc., Chicago.
Repair parts for rotary pumps, 968, \$50,063, Northern Ordnance, Inc., Minneapolis.

Repair parts for steam turbines, 2836, \$81,552, General Electric Co., Philadelphia.

Repair parts for pump turbines, 1639, \$96,079, Dravo Corp., Philadelphia.

Repair parts for diesel engines, 894, \$55,612, Baldwin-Lima-Hamilton Corp., Hamilton, Ohio, J. H. Niehaus.

Repair parts for electric motor and generators, 14675, \$250,623, General Electric Co., Philadelphia.

Shell, HE, M49A2, 60 MM, 600000, \$840,000, U. S. Machine Corp., Lebanon, Ind.

Shell, illuminating, M314A1, 105 MM, 84000, \$2,108,400, U. S. Machine Corp., Lebanon, Ind.

Fuze, PD, 1,645,575, Hardy Mfg. Co., Union City, Ind.

Replenishment of tanks & combat vehicle parts, 8500, \$402,900, Monroe Auto Equip. Co., Monroe, Mich.

Replenishment of hardware, 173520, \$1,500,684, St. Pierre Chain Corp., Worcester.

Replenishment of hardware, 40800, \$763,528, The Cleveland Chain & Mfg. Co., Cleveland.

Replenishment of motor vehicle parts, 6000, \$139,020, General Motors Corp., Detroit, R. C. Campbell.

Replenishment of motor vehicle parts, 4800, \$50,440, Mackenzie Muffler Co., Inc., Youngstown.

Defense Contracts

Plugs, dummy nose, 150000 ea, \$153,000, Stevens Mfg. Co., Ebersburg, Pa.
Fuze containers, 92400 ea, \$180,180, Melvina Can Co., Maspeth, N. Y.

Projectile tracer adapters, 209000 ea, \$58,000, Barrett Mach. Works, Houston.
Clutch spring kit, 200000 kit, \$55,000, Marquette Metal Prod., Cleveland.

Clip, wire rope and shackle, 31819 ea, \$113,807, Graybar Elec. Co., Inc., Washington.

Bombs, practice, miniature, 8500000 ea, \$335,750, Basic Foundry Co., Huntington, W. Va.

Motor metal parts, 2700000, \$13,439,700, General Motor Corp., Lansing, Mich., A. E. Goosen.

Trap and spacer assy, 3050000, General Motors Corp., Lansing, Mich., A. E. Goosen.

Head metal parts, 525000, General Motors Corp., Lansing, Mich., A. E. Goosen.

Head assy, 1816000, General Motors Corp., Lansing, Mich., A. E. Goosen.

Screw jacks, var, \$53,529, Lear, Inc., Grand Rapids.

Instruments for var aircraft, var, \$62,222, Bendix Aviation Corp., Teterboro, N. J.

Maintenance parts used on wheel and brake assys, var, \$226,285, B. F. Goodrich Co., Akron.

Mount assy, 2124 ea, \$135,422, M. B. Mfg. Co., Inc., New Haven, Conn.

Brake & wheel assy for var aircraft, var, \$204,526, Goodyear Tire & Rubber Co., Inc., Akron.

Sight front, 154934, \$60,905, Hesse Machine & Mfg. Co., Inc., Boston.

Carburetor, 8000 ea, \$99,041, Carter Carburetor Corp., St. Louis.

Shell, HE, M71, 90 MM, 212000 ea, \$1,605,476, The D. Murray Co. of Texas, Inc., Dallas.

Replenishment of motor vehicle parts, 36000, \$121,710, Firestone Tire & Rubber Co., New Castle, Ind.

Replenishment of motor vehicle parts, 6000, \$168,180, Kelsey-Hayes Wheel, Detroit.

Replenishment of hardware, 2000, \$158,760, Kramer Mach. & Engr. Prod. Co., Leavenworth, Kansas.

Replenishment of tires, 11585, \$249,658, Mohawk Rubber Co., Akron.

Replenishment of hardware, 149451, \$68,882, National Motor Bearing Co., Inc., Redwood City, Calif.

Replenishment of hardware, 9000, \$352,000, Roller Bearing Co. of America, Trenton, N. J.

Construction

Steel Inquiries and Awards

Fabricated steel awards this week include the following:

2500 Tons, Ririe, Idaho, Pen Stocks Bureau of Reclamation D3839, to American Pipe & Construction Co.

125 Tons, Chicago, produce terminal to Wendnoble & Co.

120 Tons, Milwaukee, bridge to Milwaukee Bridge Co.

Fabricated steel inquiries this week include the following:

960 Tons, Springfield, Mo., Kraft Foods, bids were due Jan. 27.

400 Tons, Chicago, LaSalle St. station, bids were due Jan. 29.

220 Tons, Cook County, Ill., Sec. 062-2991, bids due Feb. 10.

184 Tons, Bridgewater and Raynham, Mass., 3 bridges on Fall River, Boston Expressway, Frank A. Chase, Taunton, district engineer. Completion date, Dec. 1, 1953.

120 Tons, Cook County, Ill., Sec. 066-0292, bids due Feb. 10.

120 Tons, Cook County, Ill., Sec. 062-2828-1, bids due Feb. 10.

Reinforcing bar inquiries this week include the following:

825 Tons, Amesbury and Salisbury, Mass., bituminous concrete limited access road and five bridges, Charles A. Fritz, Beverly district engineer. Completion date July 1, 1954.

104 Tons, Bridgewater and Raynham, Mass., 3 bridges on Fall River, Boston Expressway, Frank A. Chase, Taunton, district engineer. Completion date Dec. 1, 1953.

Bending Heavy Beams is light work for a **WILLIAMS - WHITE** **HYDRAULIC BULLDOZER**



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- E. E. WOOD MACH'Y CO.,
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Since it was first introduced by WILLIAMS-WHITE & CO. in 1880, the Bulldozer has become one of the most useful machines in industry. A multitude of jobs, in farm equipment plants, airplane factories, railroad shops and ship yards, are being done today on modern versions of the original mechanical Bulldozer. The Hydraulic Bulldozer, one type of which is shown above, can be built to meet your requirements. Write direct or contact our representative nearest you.



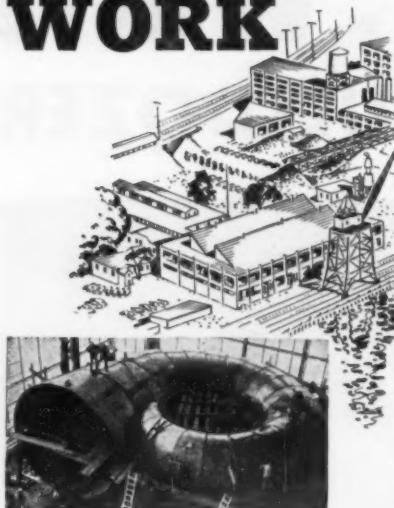
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STEEL PLATE WORK



TURBINE CASINGS

and other heavy steel plate work are fabricated at Pusey-Jones of Hot-Rolled, High-Strength, Low-Alloy Steel.

Every facility for large scale metal fabricating:

— Heavy plate shop
equipment — Rolls —
Shears — Bending fur-
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furnace 33'x18'x16' up to
2100°F. Machine shop
for facing, turning, and
boring. 50 ton capacity
gray iron foundry. Deep-
water transportation on
one side, the Pennsyl-
vania RR on the other.
Talk to our development
engineers.

Metals Fabrication Division
THE PUSEY AND JONES CORP.
504 Front Street, Wilmington, Del.
Established 1848

PUSEY JONES

Industrial Briefs

New Home — METAL PROCESS-
ING CO., INC., moved the first of
February to 41 Canfield Road, Indus-
trial Village, Cedar Grove, N. J.

Planning — AMERICAN WELD-
ING & MFG. CO., Warren, Ohio, is
planning to add 25,000 sq ft of manu-
facturing space to house machine tool
equipment.

To Build — BABCOCK & WILCOX
CO. has purchased a tract of land
south of Wilmington, N. C., and will
start erecting a new \$2 million plant.
The new plant will be used for pro-
duction of boilers and related equip-
ment.

In Business — RENIER CO., INC.,
newly incorporated firm of engineers
and designers has established offices
at 5209 Euclid Ave., Cleveland.

Quiet Please! — GENERAL ELEC-
TRIC CO. has Air Force approval for
construction of a million dollar addi-
tion to its plant near Johnson City,
N. Y. The new soundproofed building
will be used for complete controlled
testing of aircraft armament systems
being built by GE for the Air Force.

In Operation — AMERICAN
WHEELABRATOR & EQUIPMENT
CORP., Mishawaka, Ind., has com-
pleted construction of a new plant
specially designed for the manufac-
ture of "Wheelabrator Steel Shot," a
blast cleaning abrasive.

New Addition — FREEDOM-VALV-
OLINE OIL CO., has a new plant in
operation for the manufacture of rust
preventives at its Freedom, Pa., re-
finery.

Southern Sales — CAMBRIDGE
WIRE CLOTH CO., Cambridge, Md.,
has opened a new southern sales ter-
ritory with headquarters at 333 Cand-
ler Bldg., Atlanta.

Institute Reports — AMERICAN
IRON & STEEL INSTITUTE reports
that the blast furnaces in the U. S.
produced 62,158,591 net tons of pig
iron and ferroalloys during 1952.

Leases Quarters — CALUMET &
HECLA, INC., has leased quarters
for its executive offices on the 20th
floor of the People's Gas Bldg., 122
S. Michigan Ave., Chicago, for oc-
cupancy on May 1st.

Merger — FREDERIC R. HARRIS
INC., New York, has joined with
Baker & Spencer, Inc., New York.
Edward J. Quirin will be president
of both firms, and C. G. Spencer, will
continue as consultant for this group
and as a vice-president of Baker &
Spencer, Inc.

Order In — HYDROPRESS, INC.,
New York, has received an order
from Glenn L. Martin Co., Baltimore,
for a new type Marform Press with
a capacity of 6,500 tons.

New Company — AMERICAN RE-
SEARCH CORP., Bristol, Conn. start-
ed operation the first of this month
on the design and manufacture of
environmental test equipment.

Inventive Geniuses — WESTING-
HOUSE ELECTRIC CORP., has
awarded two engineers of its Meter
Div. cash awards totaling \$5000 for
their joint invention of an improved,
low-cost electric meter used to mea-
sure electricity utilized by small in-
dustrial and commercial firms. Ber-
nard E. Lenehan and Ambrose J. Pet-
zinger were the recipients of the
awards.

New Arrangement — TWIN COACH
CO., has completed a joint coopera-
tive selling arrangement with Inter-
national Harvester Co. Under the
agreement the entire line of Fageol
Van Trucks will be available through
all International Harvester motor
truck dealers and branches in the
U. S.

Still Expanding — ENGINEERING
CORP. OF AMERICA, has acquired
additional plant fabricating facilities
at 257 North Ave., Garwood, N. J.

Start Soon — CECO STEEL PROD-
UCTS CORP., will break ground for
its new Pittsburgh office and plant in
May.

New Corporation — JUDD INDUS-
TRIES, INC., 148 W. 32nd St., Cleve-
land, is a newly formed corporation
which will specialize in small, pro-
gressive stampings, utilizing auto-
matic feeds for high production items.
C. H. Judd, is president of the new
firm.

Florida Distributor — The PARKER
APPLIANCE CO., Cleveland, has ap-
pointed Florida Metals, Inc., Jack-
sonville, Fla., its distributor.

Handle materials better,
more cheaply,
with equipment made of



Minimum product weight and long product service are just two important reasons why N-A-X HIGH-TENSILE steel is ideally suited for tote boxes, pallets, conveyors, lift trucks, and other equipment used for transporting materials.

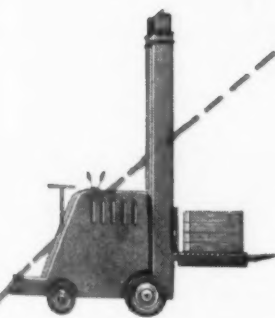
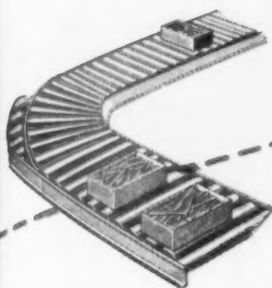
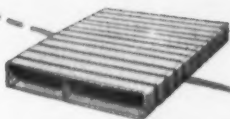
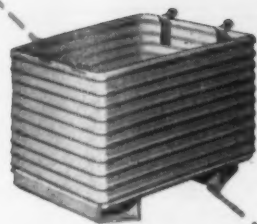
Because N-A-X HIGH-TENSILE steel has exceptional strength and durability, thinner sections can be used, yet it resists abrasion, impact, fatigue, and corrosion. N-A-X HIGH-TENSILE steel gives your equipment longer life and reduces deadweight to the minimum; you can carry a greater net load of material with no increase in the gross load weight. And N-A-X HIGH-TENSILE steel has exceptional welding and fabricating qualities — important advantages where custom-made materials-handling equipment is required.

If you are interested in better, more economical materials-handling, why not investigate N-A-X HIGH-TENSILE steel now?

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NATIONAL STEEL CORPORATION



The Automotive Assembly Line

How to Keep Tabs On The Competition

GM proving grounds runs 25,000-mile durability test on 13 of own cars, 17 competing models . . . All parts disassembled, compared after 13-week controlled test—By R. D. Raddant.

A wise auto producer knows his competition. But he doesn't do it any more by planting spies within the walls of the enemy. He has scientific tests to show how his own product measures up to the rest of the field.

In that line, General Motors recently completed what was prob-

Night & Day—Run is known as the 25,000-mile durability test. Each car was driven 25,000 grueling miles, day and night, 5 days a week for about 13 weeks. Tires lasted 8000 miles, indicating the severe wear and punishment each received. Test is equivalent to 100,000 miles of ordinary driving.

Automotive Production
(U. S. and Canada Combined)

WEEK ENDING	CARS	TRUCKS	TOTAL
Jan. 31, 1953	125,297*	25,454*	150,751*
Jan. 24, 1953	121,071	28,550	149,621
Feb. 3, 1953	74,890	27,512	102,402
Jan. 27, 1952	70,708	27,961	98,669

*Estimated

Source: Ward's Reports

ably the most exhaustive test ever run on passenger cars. Thirty cars, 13 produced by GM and 17 by competitor firms, were all given identical tests at the GM Proving Ground northwest of Detroit.

Check & Compare—At the end of the test, each car was torn down to the last nut and bolt and spread out on parallel tables where each part could be inspected for wear. GM engineers went over each corresponding part with a fine tooth comb, evaluating the performance of the GM part with that of its competitor.

Results of the test, of course, are considered top secret. Findings were viewed only by top engineering executives of GM and its car, body, parts and research divisions. This limited group also received detailed reports on performance characteristics of each car, such as miles per gal, cost of operation, etc.

Accurate records were kept on each car for failures, cost of replacement parts, labor costs, gas and oil consumed, tires worn out, frequency of required adjustments, and many other items.

Cost of parts and labor was at the rate prevailing in Detroit area service shops. All cars were maintained in accordance with the manufacturer's recommendations.

No Favorites—Complete impartiality is necessary for the success of such a test. Each car of the same general type of design was driven over the same route of varied surfaces and grades at the same speeds. The 117 drivers who participated in the test were rotated and each drove each vehicle about the same mileage.

Drivers were not skilled proving grounds drivers. They were young, between 21 and 30, and many were recruited from nearby farms.

How They Feel—What is GM's philosophy on these tests?

"We think it's the best way to find out how our cars perform," said Charles A. Chayne, GM vice president in charge of engineering staff. "And by putting our competitors' cars through the same paces, we find out how our cars stack up against them. In a word or two, it's an engineering audit of all popular American cars."

For the record, the 30 cars rolled up 750,000 miles during the test bringing the proving ground's total mileage to 126,244,701 in GM's 28 years of testing here.

More Significant — Automatic handling or factory mechanization is frequently considered merely a method of speeding production and cutting labor costs.

That it has deeper significance in our economy was pointed out in Detroit last week by Arthur F. Vinson, assistant manager of manufacturing for General Electric Co. Speaking before the annual meeting of the Cutting Tool Manufacturers Assn., he said that mechanization is not only advantageous, it is necessary in maintaining production goals.

Growing Fast—He pointed out that the "gross national product is expected to increase from \$345 billion in 1952 to \$410 billion in 1961." During this decade, he predicted that the electrical industry will grow twice as fast as the rest of the economy.

"To achieve this rate of production would require twice the number of people now employed in the industry," he said. But at the same time, the labor force is expected to increase only 11 pct.

According to Mr. Vinson, the answer to increased production without greatly expanding the labor force or factory space is to increase through mechanization the productivity of existing plants and the labor force.

Automotive News

LABOR:

Reuther firm against keeping old
CPI index for rest of contract.

Developments on the Bureau of Labor Statistics cost-of-living issue last week did not clarify the outlook for continued labor peace in the auto industry.

Last week, UAW President Walter P. Reuther held firm against any attempt to revive the old index for the duration of the contract in the interest of maintaining a continuing pact. Pressure to do so reportedly was brought straight to Mr. Reuther by the auto companies, Secretary of Labor Martin P. Durkin, AFL unions and some senators.

Rift Widens—If this pattern remains the same, it points to a widening rift between the UAW and both the auto industry and the AFL. Secretary Durkin, an old AFL hand, and Mr. Reuther are already cool toward each other, principally because the UAW was left off the Labor Dept.'s policy-making body. The new index has been under planning for 3 years. It is now ready for publication late in February. Contracts will have to be rewritten if the new index is to be substituted. This loophole was intended by the UAW to provide renegeing of the contracts for new wage patterns and other revisions. Labor Secretary Martin Durkin says the government will still stick with the new index as "the best" in spite of opposition from some segments of labor and industry. It will be used as a guide for public policy.

But with full White House approval, publication of the old index will be continued until the end of June although it was to have been discontinued at the end of December. It is to be issued for comparative purposes and sole benefit of "labor and business concerns which have contracts based on it."

Some contracts have already been converted. Others are in the making. Present thinking is that the 6-month extension should provide sufficient time for working out "transitional problems."



TESTING: Ten of the 30 cars used in GM's recent test run of the passenger car field swing around a curve of the proving grounds track. Each car, GM and competitor alike, was subjected to the same rigid test. (See p. 54.)

Army Releases "Otter" Detail

After almost a year of deliveries to the Army, Ordnance officials have released details on the all-aluminum "Otter," the versatile amphibious carrier that is being produced at Pontiac Motor Div.

Ordnance explained that details were withheld previously in that they revealed Army plans for non-armored, non-combat, airborne use.

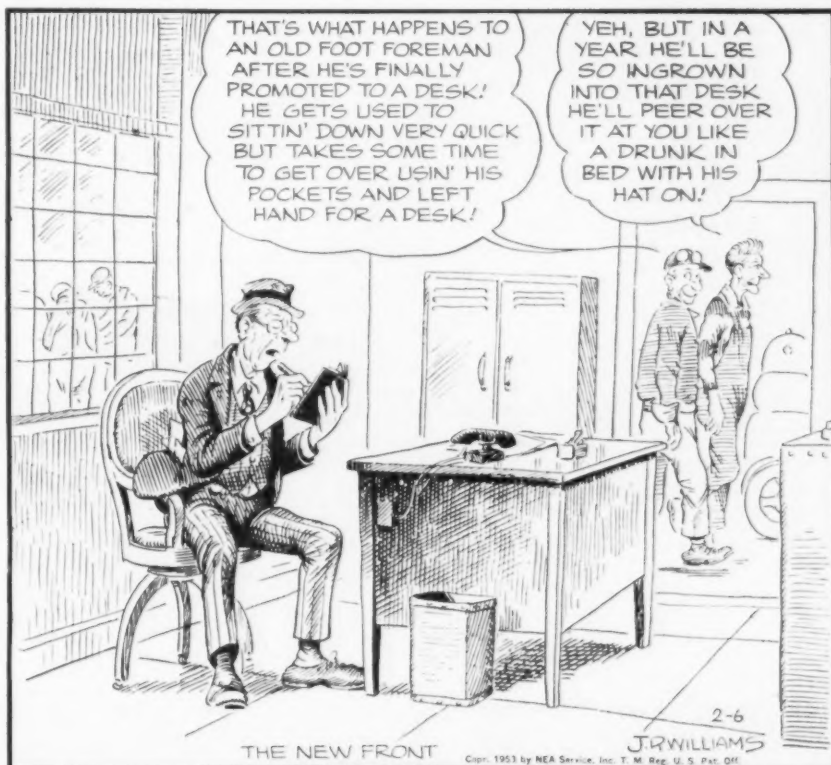
Original models were designed over 5 years ago by GM Technical

Development and Army Ordnance engineers. Implication is that it was designed for use in the Arctic and probably played a big part in construction of Arctic bases.

Gross weight is a little more than 4 tons. It will carry about 1½ tons of load and has a speed of 28 mph on land and 4 mph in water when propeller driven. It is powered by a 4-cylinder Continental Motor engine and has wide 30-in. tracks for easy negotiation of swamp, muskeg, tundra and heavy snows.

THE BULL OF THE WOODS

By J. R. Williams



THE NEW FRONT

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... is proof of the superiority of



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"Mr. Big" - being completely free of harmful carbide segregation is proof that a positive control exists for eliminating segregation.

"Mr. Big" could not be produced to the same high quality standards by any process other than the "DESEGATIZED" process.

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This Week in Washington

Ike: 'Scrap Controls and Cut Budget'

State of Union message points to death of controls—Apr. 30 for wage-price laws, June 30 for CMP . . . Ike has faith in industry . . . Trim budget before cutting taxes—By G. H. Baker.

Congressional attitude toward President's Eisenhower's State of the Union message points to a definite close-out of all federal price and wage control authority on Apr. 30. Survey of opinion at the Capitol this week discloses a clear-cut disposition to ignore demands for new control authority.

In a 7000-word message to Congress characterized by strong optimism in the potential of the nation's industry and by faith in the "atmosphere of freedom" that has built U. S. economic strength, Mr. Eisenhower also proposed that:

- (1) Material and product controls, such as CMP, be ended on June 30, except for defense priorities and scarce and critical items essential to defense;
- (2) Tax reduction be postponed until the budget is balanced;
- (3) Congress stiffen its resistance to further demands for funds until a balanced budget is achieved.

The Stalin Factor—Only "if" on this bright horizon for business is the chance that the Kremlin may upset the new Administration's economic planning with a new threat of armed aggression. Should such a move take place within the next 90 days, all plans for erasing controls would quickly be called off.

Pledges by Ike of "unremitting efforts" to end waste and duplication of effort in the military forces generally meets with thumping approval of both Senate and House majorities.

Debt Inheritance—Nearly all congressmen are agreed that this is a ripe area for fiscal pruning. But there is sober agreement between Capitol Hill and the White House that the staggering national debt inherited by the new Ad-

ministration and the prospective \$9.9 billion budget deficit for the coming fiscal year pose a problem of critical concern to members of both political parties.

Trimming the national purse to fit the income will not come easily, it is pointed out in Capitol cloak-rooms, to elements of the economy accustomed to federal largesse on a large scale during the past 20 years.

Rift on Taxes?—On the subject of tax reduction, there is danger of a serious rift between Congress and the Administration. Both agree that tax relief is highly desirable at the earliest possible date. But there Ike and the House leadership part company.

Ike takes the firm position that reduction of taxes will be justified only "as we show we can succeed in bringing the budget under control." House leaders, particularly Chairman Reed, R., N. Y., of the Ways and Means Committee, are equally uncompromising—at this point, at least in their drive

for income tax reductions by next June 30.

"Controls Flopped"—Controls of wages and prices, Ike says bluntly, have been a flop. "The character of our people resists artificial and arbitrary controls of any kind," he declares. "The great economic strength of our democracy has developed in an atmosphere of freedom."

On labor problems, there is a near-unanimous agreement within Congress over Ike's statement that neither labor nor management gain by bringing their labor problems to Washington. It is now painfully clear to both sides that labor and business can, as Ike puts it, "Best resolve their wage problems across the bargaining table."

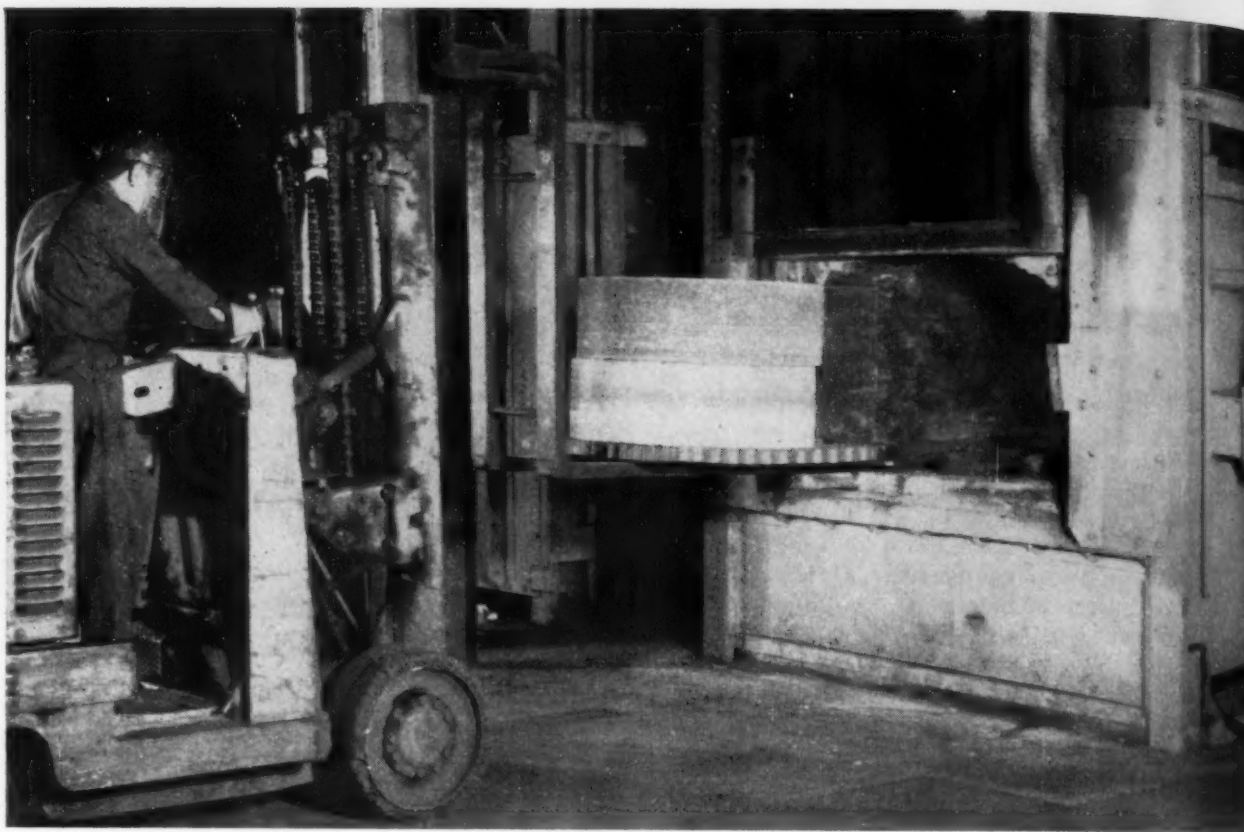
Government, it is agreed, should refrain from poking its finger into bargaining pies unless—and then only in extreme cases—the public welfare requires protection.

Revise Taft - Hartley—Again, there is agreement between the Administration and the Congress that the nation's basic labor law—Taft-Hartley—is in need of revision. Sen. Taft, R., Ohio, plans to open hearings soon on 16 proposed changes to the law he co-authored. From the White House point of view, no opportunities to weld a lasting labor-management peace are to be omitted.

"The Administration intends to strengthen and to improve the services which the Labor Dept. can render to the worker and to the whole national community," Mr. Eisenhower states. As a follow-up to this stand, he has authorized the Labor Dept. to create "promptly" a tripartite advisory committee consisting of representatives of employers, labor, and the public.

Reaction to this proposal is mixed. Some segments of management are wary of such a committee, fearing that it may—despite the good intentions behind it—turn out to be weighted for unions.





HOW LONG SHOULD A FURNACE LINING LAST ?

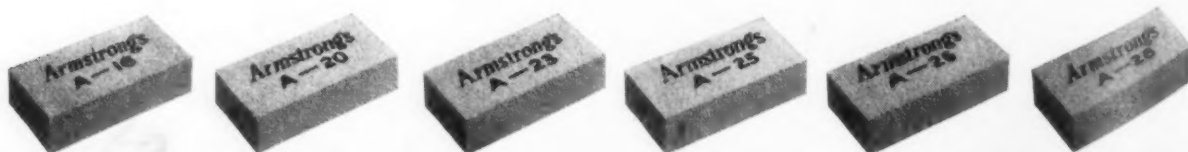
No one can accurately predict how long the lining of a heat treating furnace will last. But one thing is certain. Furnace linings of Armstrong's Insulating Fire Brick usually last a long, long time. To get the longest life from them, the type of brick used must be matched to the service requirements of the furnace.

Take the furnace pictured here as an example. It's a high temperature homogenizing furnace used at the Lebanon Steel Foundry, Lebanon, Penna. Its operating temperature varies from 1600° to 2250° F., depending on the type of steel being treated. Operation is intermittent, and frequent door openings and closings add to the thermal shock on the lining. To meet the rugged conditions of this service, it was decided to line the furnace with Armstrong's A-26 Insulating Fire Brick. The brick lining was installed in August 1944. That A-26 lining proved to be a

wise choice, because today, almost nine years later, those same brick are still intact and under heat practically every day.

In heat treating furnaces of all types, Armstrong's Insulating Fire Brick have proved that they will last a long time, saving fuel and allowing more efficient furnace operation year after year. Every one of the six brick types in the complete line gives you a well balanced set of physical properties. Insulating efficiency is high, yet the brick are strong, too. They're light weight, but at the same time have great resistance to spalling and to compression under load.

If you build or use heat treating furnaces, it will pay you to get the facts on these better balanced insulating fire brick. Call the Armstrong office or distributor nearest you or write today to Armstrong Cork Company, 4902 Mulberry St., Lancaster, Pennsylvania.



ARMSTRONG'S INSULATING REFRACTORIES

INDUSTRY: Spending to Decline in '53

Expansions over the peak, new plant investments to drop \$600 million, say economists . . . Biggest cuts expected in metal producing, metalworking—By A. A. Rannells.

Most expansion plans are over the hump. Nevertheless, the iron and steel industry's expenditures for new plant and equipment during 1953 are not expected to be more than 17 pct below the 1952 outlay.

On the basis of recent surveys, government economists predict a drop-off of about 4 pct this year in capital investment for industry and business as a whole. This would work out at about \$600 million less than 1952's record \$27 billion.

Biggest reductions will be found in the manufacturing field, where many expansion programs are well on the way toward completion. Machinery production is a notable exception.

Biggest Slices—Most sizable reductions in capital spending schedules will come in the following production fields: Iron and steel, non-ferrous metals, metal products, fabrication, and manufacture of motor vehicles and other transportation equipment.

The iron and steel industry, having spent a total of about \$3 billion during 1951-52, is calculated to pay out about \$1.4 billion this year in rounding out its program—about \$300 million less than for 1952.

In the nonferrous group, the spending schedule as now anticipated will run about \$375 million. This will be about 25 pct less than last year but still one-third more than the \$277 million paid out in 1951.

Aluminum Program — Completion of aluminum expansion programs will account for a substantial portion of the cutback in the non-ferrous group. Some of the reduction in expenditures by aluminum producers, however, will be partially offset by increased investment in additional copper facilities.

Expansion of production capacity for motor vehicles, aircraft, and

railroad equipment is now on the downgrade.

About \$1.5 billion has been poured into new motor vehicle facilities during the past 2 years. Indications now are that no more than about \$685 million will go for this purpose during 1953—about \$125 million less than last year.

Machinery Up — On the other hand, manufacturers of machinery expect to boost their expenditures this year for both new plants and equipment. This applies to both electrical and non-electrical field. Generally speaking, considerable expansion is yet to come in the agricultural machinery and equipment category.

Some increase in capital expenditure by the mining industry is expected. Most of this, however, will come from gas and oil extraction. Among the iron ore and other metals mining industries, the rate is expected to be about the same as in 1952.

ODM Names Vance as Consultant

Washington rumors that Harold S. Vance would be selected to head the Office of Defense Mobilization were laid to rest last week when he

was named by Acting Director Arthur S. Flemming to the post of consultant to that agency.

President and board chairman of Studebaker Corp., Mr. Vance has been on a consulting basis with ODM over the past several months, largely confining his work to a study of military type production equipment.

His committee recommended that the government spend \$500 million a year for the next decade in building and stockpiling special purpose machine tools and other military type capital equipment.

In the new post, however, the Studebaker head will be available for consultation on all matters pertaining to the mobilization program, including production-price-wage controls.

Top Pentagon Nominees Okayed

Defense Dept. buckled down this week to the job of mobilization following Senate confirmation of Charles E. Wilson, former General Motors Corp. head, to the post of Defense Secretary.

Approval of three top aides, Robert T. B. Stevens, Harold A. Talbott, and Robert B. Anderson, as Secretaries of the Army, Air Force, and Navy, was expected to follow this week since legal obstacles were quickly being cleaned away. These were largely a matter of disposal of stockholdings in companies doing business with the military services.

Approval followed after appointees agreed to sell their stocks.

ICC Orders New Freight Split

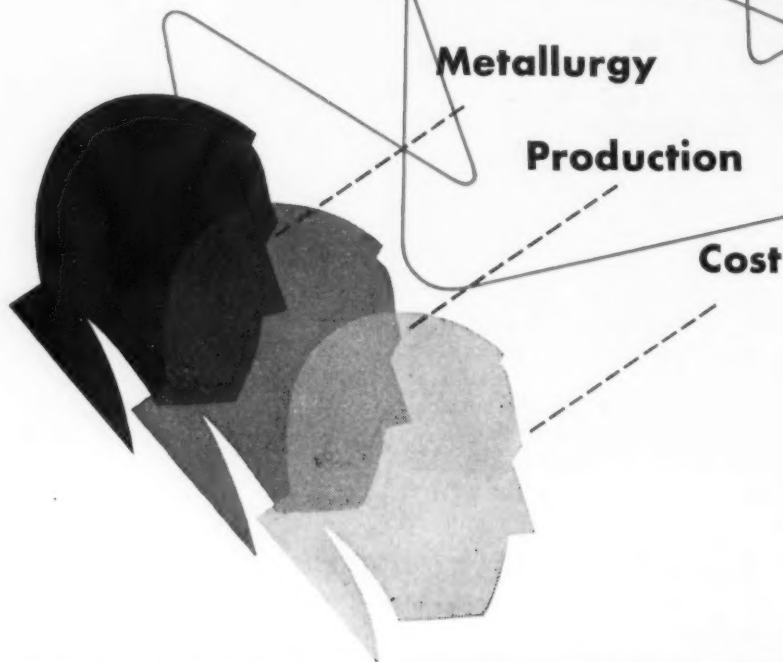
A new division of revenues that would give eastern railroads up to \$42 million more annually was approved last week by the Interstate Commerce Commission.

Under the order, effective Apr. 1, freight rates charged the shippers will not be changed. Instead, it will determine how the freight revenues on shipments between eastern and south-southwestern territories shall be divided.

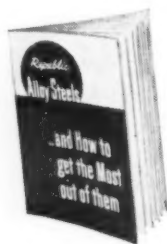
The new formula on splitting the revenue does not apply to coal and coke shipments.



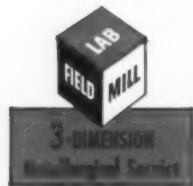
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Your metallurgist and production manager may be stumped by a steel problem. Or may want confirmation of steel grades or heat treatment. Ask your Republic salesman to call in Republic's 3-Dimension Metallurgical Service. It is yours to use.

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Other Republic Products include Carbon and Stainless Steels—Sheets, Strip, Plates, Pipe, Bars, Wire, Pig Iron, Bolts and Nuts, Tubing

Steel Grows Fast to Meet Demand

Western ingot capacity gained 7.85 pct in 1952 . . . CF&I had biggest tonnage gain, Northwest Steel grew most percentage-wise . . . U. S. Steel still biggest—By T. M. Rohan.

Western steel is still making major strides in the race to catch up with demand. Last year it scored another major gain of 7.85 pct, capacity figures released last week by the American Iron and Steel Institute showed.

In the traditional marketing area of the seven western states overall capacity jumped by 406,100 annual net tons or from 5,171,900 to 5,578,000. Total gain for the larger IRON AGE Western District including the 11 western states plus Texas and Oklahoma augmented by several newcomers was 10.07 pct or 768,500 tons.

Who's Biggest?—Leading all new western capacity tonnage is Colorado Fuel and Iron Works at Pueblo, Colo., with 165,000 more tons. Percentage-wise it beats Kaiser among major producers with 12.5 pct increase.

Biggest steel producer in the West is still the war-born U. S. Steel mill at Geneva with 1,675,000 ton capacity.

Most Tonnage?—Tonnage-wise the principal gainer in the seven states was Kaiser in the midst of a \$65-million expansion program with 156,000 tons or an 11.3 pct increase. Following closely was U. S. Steel Columbia-Geneva Div. with 107,600 or 4.9 pct, principally at the Pittsburgh, Calif., mill.

In Show Position—Third highest gainer was Pacific States at Niles, Calif., with 66,000 tons more or 28.4 pct.

Percentage-wise the biggest gainer was Northwest Steel at Seattle, at 29.6 pct but only 9600 tons. Other percentage leaders, all smaller producers, were Pacific States at 28.4 pct, Southwest Steel at Los

Angeles, 25 pct, and Seidelhuber at Seattle with 21.7 pct.

By States—California expansions led by the Fontana, Pittsburg and Niles advances pushed that state far ahead with 280,800 tons gain or 9.2 pct. U. S. Steel put Utah second with 75,000 tons more while Washington was third with 50,300 although leading percentage-wise with 12.6.

Only decrease anywhere was National Supply at Los Angeles with a 25.5 pct drop from 63,000 to 50,200. National Supply, currently selling 60 to 70 pct of its steel output as blooms for forging, cut the shells of its three furnaces some years ago for better diversity in heat selection. During World War II they were run at maximum size for top capacity.

Newcomers—Only newcomers in the larger IRON AGE Western District were Cameron Iron Works at Houston with 58,800 electric ca-

capacity and R. G. LeTourneau Inc., at Longview, Tex., with 138,600.

R. G. LeTourneau, who investigated gas fired furnaces in the Los Angeles area 2 years ago, is rolling plates for his road building equipment plant at Longview.

Second Place—California ranks second only to New York in Munitions Board contracts placed since start of the Korean War. National Production Authority figures released last week showed New York with \$12 billion or 17 pct of the total \$71.2 billion and California with \$9.2 billion or 12.9 pct. Actual California participation is believed somewhat higher due to greater subcontracting from out-of-state prime manufacturers.

Rags to Riches—Despite the worst northwest power shortage in history last year Bonneville Power set a new revenue record of \$38.2 million. Heavy consumption early in the year and added aluminum capacity during the year pushed loads to record highs.

August sale was \$9.8 million but dropped to \$3 million in September when interruptible was cut off and hit bottom of \$2.6 million in December when firm power was cut.

Jet Chutes—Pilotless jet target planes, falling at the rate of 600 mph, have been recovered undamaged through use of new lightweight parachutes, in tests conducted by Ryan Aeronautical Co. and U. S. Air Force at Holloman Air Development Center, Alamogordo, N. M.

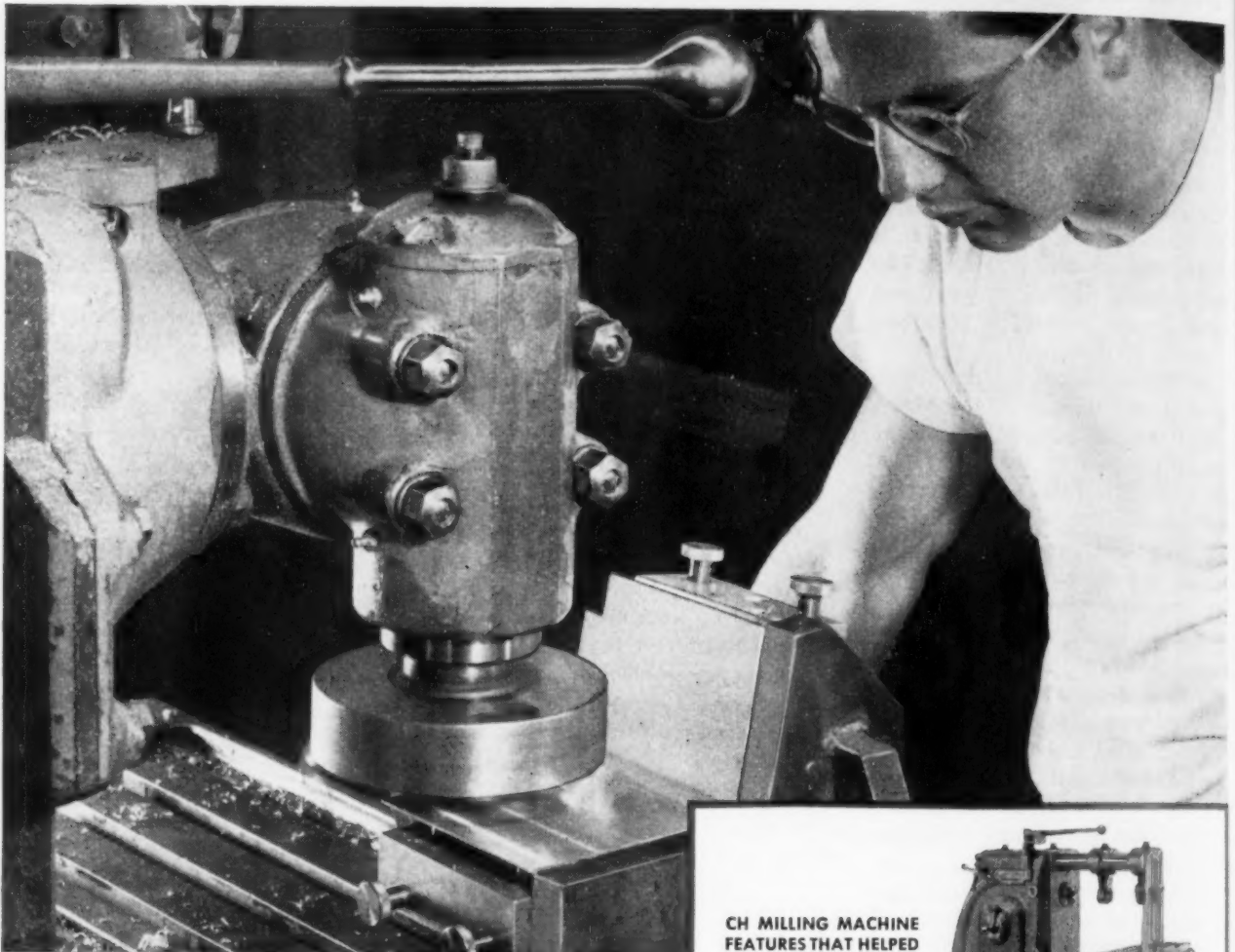
Purpose of the tests was to develop a technique of safely recovering Ryan Q-2 remote-controlled pilotless jet planes so that they could be used repeatedly in target runs. During the tests, objects weighing as much as 1500 lb were dropped without damage.

In addition to their use with target jets, the parachutes could also be employed to drop heavy combat equipment such as howitzers, jeeps and ammunition.



"A good man is hard to keep."

5 MINUTES PER PIECE WITH THIS VERSATILE NEW KEARNEY & TRECKER CH MILLING MACHINE



Speeds fabrication of aircraft parts from 75ST aluminum alloy

HERE ARE THE FACTS ON THIS JOB:

Location: - - - - Mar Vista Engineering Co., Los Angeles, Calif.
Machine: - - - - 5 hp, No. 2, Model CH, Plain Style
used with Universal Milling Attachment.
Part: - - - - Aircraft fitting for horizontal stabilizer.
Material: - - - - 75ST aluminum alloy.
Cutter: - - - - One blade — 8" fly cutter.
Cutter Speed: - - - - 875 rpm, 9 ipm feed.
Depth of Cut: - - - - .050".
Production: - - - - 12 pieces per hour — all sides milled.

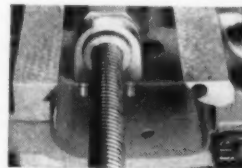
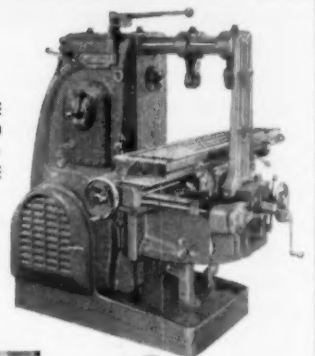
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INCREASE OUTPUT —
CUT COST PER PIECE**

**5 hp No. 2 MODEL CH
Plain Style Milling
Machine.**



Smoother feed performance
through a heavy duty 2" dia. table feed screw. 23% greater bearing contact between screw nut for longer screw life and accuracy.



Greater cutting efficiency — design refinements in 3-bearing spindle and a train of heavy duty, wide-faced, forged steel gears, hardened and specially processed.

Speed range—16 speed changes are provided from 25 to 1500 rpm. **Extra-wide feed range**—16 changes from 1/4" to 32" per minute meet requirements of new metals and cutting tools.



Machine Tool High Spots

Tool Improvement Must Take New Path

**Efforts to increase productivity near point of no return . . .
Output can be increased through improved parts handling
. . . Business better than expected—By E. C. Beaudet.**

Many builders and users of machine tools are convinced that further efforts to boost tool productivity are reaching the limits of practicality.

During the last 20 or more years exhaustive studies have been made on how to increase feeds and speeds through use of certain cutting tools and coolants. Power has been upped, machines and tool holders have been made stronger, and chip removal has been studied intensively. The results have been worthwhile.

Now it appears that these efforts are approaching the no return point. The most profitable area for increasing the output of machine tools is believed by many to be in another direction.

Time Is Wasted—Recent studies of machining operations have shown that actual cutting operation requires less than 20 pct of the time a part is in a machine. The great bulk of time required in machining is consumed in putting the part in and taking it out of the machine.

Impressive gains have already been made in this field, but there is still room for improvement. Any method of cutting the time required to process a part must be adopted because the continuing spiral of labor and material costs makes the production cost of a finished product the only place where savings can be made.

What Can Be Done — Greatest advances in reduced handling of parts has been achieved in automotive plants through use of transfer-type, indexing and trunnion machines. Although the majority of manufacturing plants

using machine tools are not assembly line producers, it is believed that more automatic handling devices are needed, particularly from the point where a transfer mechanism in an in-line operation leaves off and the actual cutting begins.

One idea being considered is building more machine tools in which parts pass through one side of the machine and come out the other, rather than in and out the same side.

Emphasis on reducing parts handling doesn't mean that future studies of cutting operations will not prove beneficial. However, it does seem there is more room for improvement in handling operations.

Make Them Swapable — Another trend in the machine tool industry is standardization. Although special machines are re-

quired to achieve high production, standardization of components such as bases, spindles, pumps, gears, motors and electrical equipment for these machines is growing.

As more machines are built to do special jobs, the more standardized they become. In many cases, operating principles of two special machines built to do different jobs are identical. Therefore the two machines are basically standard machines with variations required for specific operations. Standardization of all types of machine tools, whether general purpose or special, will permit easier servicing and lower maintenance costs for users.

More Business — Reports from sales managers of machine tool firms indicate that while sales so far this year have not kept pace with the 1952 rate, more business is coming in than was expected. Another heartening factor is the appearance of a considerable number of diversified non-military manufacturers on the market. Also improving the sales outlook for 1953 is the expected decrease in cancellations, which ran as high as 50 pct for some tool firms last year.

Change Their Minds — Design changes, necessary as they may be, continue to plague some machine tool builders, particularly those working on Air Force programs. One firm recently had to change tooling four times on one machine before it was finally shipped.

Although payment is made for engineering and other charges caused by these design changes, they are still a nuisance to the builder. Sometimes a tool held up in the plant takes up space that could be put to more productive use.

As one builder put it, "My firm is in business to make and ship machine tools, not to sell engineering time."



COOLER OPERATION

another reason why OHIO is the **PREMIER** mill magnet

Morning . . . noon . . . night—Ohio Magnets lift efficiently, uniformly over extended periods of time because they operate *cooler*.

Take this husky Ohio Bolted Magnet. The heavy-duty copper strip coils are wound in longer lasting inorganic insulation and carefully sealed with plenty of non-cracking asphaltum.

For extra magnet life, extra magnet value—specify Ohio Magnets. And remember, *Ohio Magnets lift as much or more than other magnets of the same size.*

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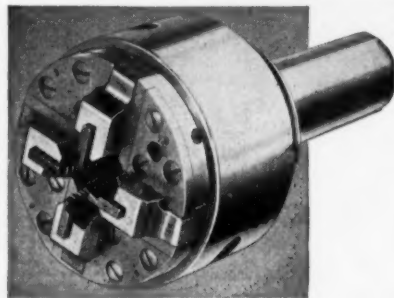
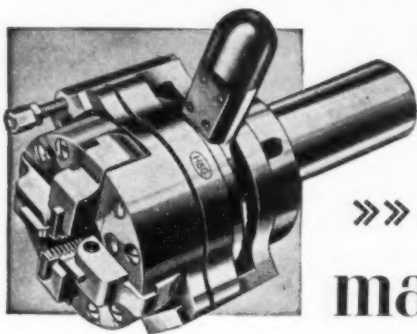
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THE
NEW
PRODUCTION
DESIGN
SIMPLIFIES
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THE ACTUAL IS LIMITED:

THE POSSIBLE IS IMMENSE

NEW LINCOLN PLANT CREATED BY INCENTIVE-INSPIRED CO-ACTION IN DEVELOPING POSSIBILITIES IN PRODUCT

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WELDED STEEL DESIGN SIMPLIFIES PRODUCTION... CUTS COST ON MACHINE TOOLS

by William B. Boice

Boice-Crane Company, Toledo, Ohio

COSTLY machining operations like milling castings can be eliminated by designing for welded steel construction. On our jointer, for example, the top surface is now finish ground to close tolerance in one setup after welded assembly. Wherever machining is required, with steel construction precision tolerances are often held in one cut as compared to rough and finish cuts required on most castings.

Since steel is twice as rigid as gray iron, less material is needed to resist deflection under load. If made from castings, our jointer would weigh twice as much and still be subject to inaccuracies from deflection and warpage no longer experienced in the present welded steel construction.

With less material, less machining and fitting involved, shop costs are reduced. Furthermore, the modern appearance achieved with the welded design has greatly improved selling appeal.

Fig. 3. Welded steel design of 8" jointer is stronger, more rigid yet weighs half as much and costs less than cast construction. Courtesy, Boice-Crane Co.

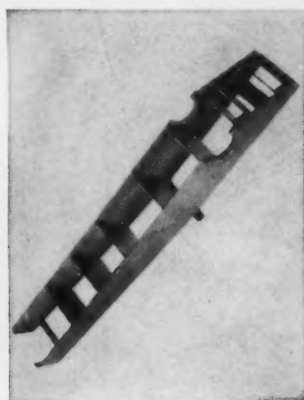
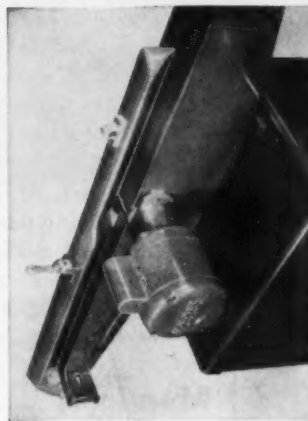


Fig. 4. Efficient girder-like structure forms rugged frame for table. Top is welded to frame with intermittent welds and finish ground in one setting.

WELDED DESIGN ALWAYS SAVES STEEL AND LOWERS COST

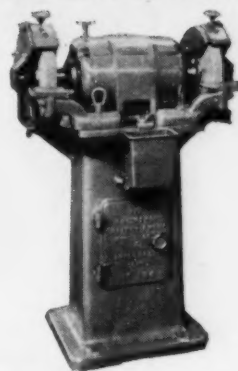


Fig. 1. Original construction of pedestal grinder required costly milling and drilling using heavy machine tool equipment. Casting had to be filled and painted to obtain quality finish for sales appeal.

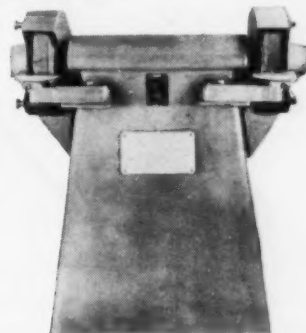


Fig. 2. Present welded steel design. Quality of product and appearance improved to enhance sales appeal. Stability increased by lowering motor into pedestal base. Weight is cut 35% yet product is more rigid and costs 12% less to produce. Courtesy, The Bridgeport Safety Emery Wheel Co., Inc., Bridgeport, Conn.

MORE PROOF

Machine Design Sheets available on request. Designers and Engineers write on your letterhead to Dept. 1501,

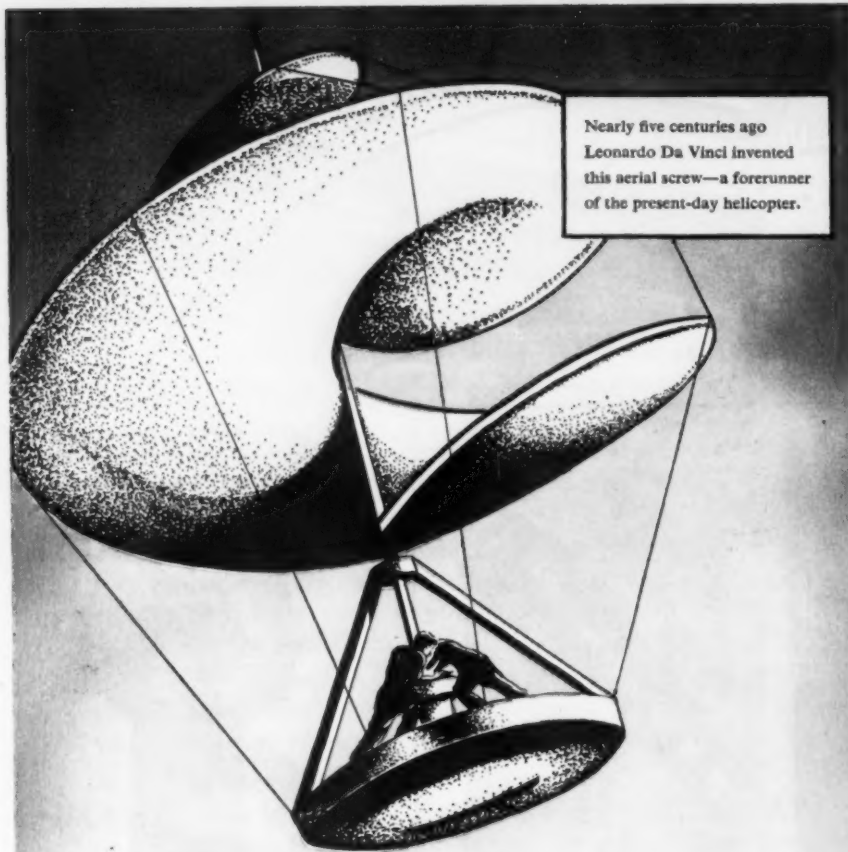
THE LINCOLN ELECTRIC COMPANY
CLEVELAND 17, OHIO

THE WORLD'S LARGEST MANUFACTURER OF ARC WELDING EQUIPMENT

February 5, 1953

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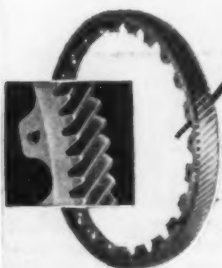


Nearly five centuries ago
Leonardo Da Vinci invented
this aerial screw—a forerunner
of the present-day helicopter.

*... out of this
came Aviation*

... an industry with imagination

To serve this great industry there are many manufacturers with imagination and vision. Indiana Gear is such a company—a group of able craftsmen equipped with the best of tools and machines—producing the finest in precision parts. At I.G.W. we accept the challenge of this and all other precision industries. We will match their visionary design with creative production.



Indiana Gear fabricated this large steel ring gear for the main transmission of a recent model Sikorsky Helicopter, without grinding and without heat treat distortion. Originally, the helical teeth on this gear were ground, but a necessary power increase overloaded the part and it failed. It was assumed to be impossible to successfully heat treat the unground teeth, but I.G.W. produced the part without distortion and the gear operated successfully.



INDIANA GEAR

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Free Publications

Continued

Metalworking

A new 32-p. catalog describes the way Di-Arco Metalworking Machines perform a wide variety of forming, cutting and punching operations in medium and light weight materials. Of particular interest are the machine specifications and material forming capacities which are presented in tabular form for quick, ready reference. *O'Neil-Irwin Mfg. Co.*

For free copy circle No. 14 on postcard, p. 126

Dieing machines

In a new 60-p. catalog complete specifications on a line of high speed automatic dieing machines are given. Machines covered range in capacity from 25 to 400 tons. Photographs show various stages of production, from raw stock to finished part, of 25 typical parts made by dieing machines for metalworking, automotive, electrical and other industries. *Henry & Wright Mfg. Co., Div. of Emhart Mfg. Co.*

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Mandrels

Setting up jobs for machining is an expensive operation because of manhour costs. But shops equipped with Champion Expanding Mandrels can reduce setting up time, since all the operator has to do is select the right size mandrel, insert it in the hole and tap the large end of the arbor. A full set of Champion mandrels makes it possible to fit any hole from 1/2-in. to 9 1/2-in. diam. More information is contained in a new folder. *Western Tool & Mfg. Co.*

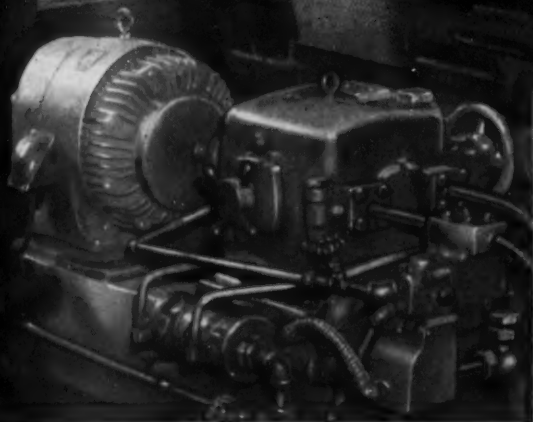
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Lubrication

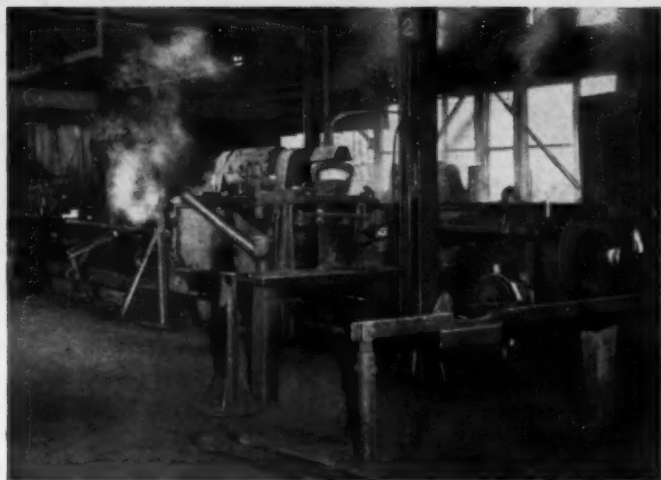
Lubrication of ball bearings is the topic of a new leaflet available from Fafnir Bearing Co. Information is given on the advantages of oil or grease, and recommendations are made on housing designs for grease lubrication. Lubrication techniques for vertical mountings are included. *Fafnir Bearing Co.*

For free copy circle No. 17 on postcard, p. 126

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AGE



**OILGEAR DRIVES ON GLAMORGAN
CENTRIFUGAL PIPE CASTING MACHINE**



Something more than 5 years ago, the Glamorgan Pipe & Foundry Company, of Lynchburg, Va., a leading manufacturer of cast iron pipe, designed its own centrifugal pipe casting machine, using Oilgear Fluid Power equipment to tilt the ladle and move the cast-carriage.

The degree of control over pouring rate and carriage travel afforded by Oilgear has had almost unbelievable results. Scrap caused by irregularities in moving parts has become negligible. Weight controls are well within the close limits set by Industry specifications. Only 3 men are

needed to operate the equipment. Despite the fact the machine has averaged 500 operations per day since 1948, maintenance on Oilgear equipment has totaled less than \$200.00. The fumes and dirt necessarily present in foundry operations have had no effect on Oilgear fluid power equipment.

TYPICAL OF OILGEAR'S ABILITY TO SOLVE MACHINE DESIGN PROBLEMS

It takes power to tilt a ladle and move a pipe casting machine carriage. But above all, it takes absolute and precise control of the speed of pouring and the speed of carriage travel if the product is to be perfect and uniform.

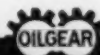
It not only takes power but power under control to print in register on flimsy cellophane at high speed, to set up paper piles for repetitive serial cuts to hairline register automatically, to cut fish on a continuous conveyor to accurate weight for canning, to vary the speed of a large beater automatically to conform sensitively to the changing viscosity of the mass.

These are all triumphs of Oilgear Fluid Power—where this flexible, controllable, versatile power leads the way to better machine design or to the solution of hitherto unsolved problems.

Think of Oilgear Fluid Power as identical with electrical power . . . generated by a pump . . . applied over conductors through a motor or motor element. But

Oilgear Fluid Power can be converted into linear movement as well as rotary; can be exerted statically, without motion; can be varied infinitely, steplessly without additional equipment.

And the unique Oilgear design is oil hydraulic design at its simplest and best. It is generally accepted as the leader in its field. It will cost you nothing to see what Oilgear can do to improve the salability of your equipment . . . may profit you and your users in an amazing degree. **THE OILGEAR COMPANY, 1581 W. Pierce St., Milwaukee 4, Wisconsin.**



OILGEAR

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NEW EQUIPMENT

New and improved production ideas, equipment, services and methods described here offer production economies . . . just fill in and mail the postcard on page 123 or 124.

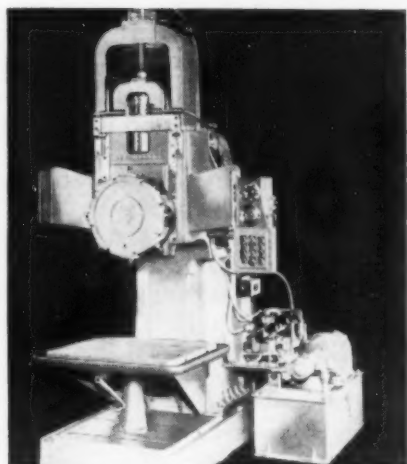


Combines press brake-stamping press functions

The principle functions of the press brake and the stamping press are combined into a press type brake of greater versatility and speed. On the 30-in. wide bed, blanking, piercing, shallow draw, bending, and trimming can be done at a standard speed of 45 strokes per min or as high as 60 on fast light work. Closed side housings, oversize slide areas, end feeding, a new direct-acting clutch-brake combination that needs no adjustment

for wear are among outstanding features. Standard stroke is 5 in. and shut height 14 in. with a ram adjustment of 5 in. Serial operation and end feeding speeds up production by eliminating work transfer from one machine to another. Five sizes, 4, 6, 8, 10 and 12 ft bed lengths are fully rated at 150 tons each. Wider bed areas and 225-ton capacity can be obtained. *Cyril Bath Co.*

For more data circle No. 18 on postcard, p. 123.

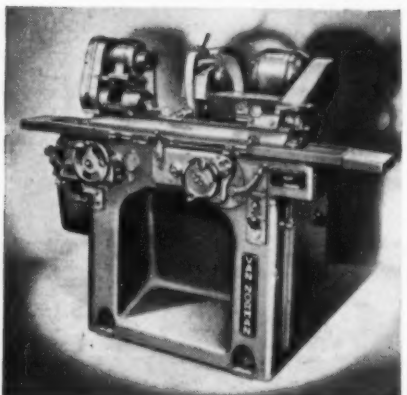


Large capacity drilling and tapping machine

Accuracy, rigidity, ease of setup, power, spindle speeds, infinitely variable feeds, make the Burgmaster Model 3-BH eight spindle, automatic, hydraulic drilling and tapping machine suitable for short, intermediate or long runs, in any type of material at optimum cutting speeds. The machine can be used on straight drilling operations, or on complicated forming tools for ID or OD turning, tapping, threading, plunge cut end milling, large counterboring, and spot-

facing and any other second operation. Standard parts such as motors or electrical components are used to minimize maintenance. Specifications: 1 1/4 in. drill capacity in mild steel; 12-in. spindle and head travel; 19-in. table travel; 17 1/2-in. throat clearance. Table work surface measures 36 in. wide x 35 in. deep, with T slots. Twelve preselective spindle speeds range from 167 to 1765 rpm—four to each spindle. *Burg Tool Mfg. Co.*

For more data circle No. 19 on postcard, p. 123.



High production grinding of small parts

The new 418 grinder has been developed for fast precision traverse or plunge cylindrical grinding of small parts on a production basis. It is especially adaptable for economical grinding in toolroom and job shops. Recessed design of the base permits the operator to sit comfortably at the machine, insuring maximum production throughout the day. All controls are grouped within easy reach from

the operating position. Features include pope wheel spindle, automatic starting and stopping of headstock and table traverse. Grinding wheel speeds are 1772 and 2067 rpm; headstock work speeds 153 to 940 rpm. Maximum grinding diameter 4 in. Distance between work centers is 18 in. Lubrication is semi-automatic. *Van Norman Co.*

For more data circle No. 20 on postcard, p. 123.

New Equipment

Continued



Trim router handles large nonferrous sections

Designed especially for the aircraft industry, the new No. 327-T trim router is suited for trim routing large and difficult-to-handle nonferrous sections. Either of two spindle speeds, 10,000 and 20,000 rpm is easily obtained with a selector lever and a simple belt change. Three, 5, or 7½ hp spindle drive motors at 3600 rpm are optional. Dimensions of the machine

include a 27¾-in. throat clearance and a floor-to-guide pin holder height of 32¾ in. Adjustable distance from the end of the guide pin holder to the face of the spindle ranges from a 3-in. minimum to maximum 9¼ in. Spring-loaded, sliding pin holder provides a 6¼ in. maximum stroke.

Ekstrom, Carlson & Co.

For more data circle No. 21 on postcard, p. 123.



Machine straightens tube length in one pass

Heavy duty tube or bar straightening machine, products of Keserling & Albrecht, Germany, straighten entire tube lengths in one pass at a rate of 165 fpm, without tube damage, deformation, impressions of spiral markings. Heavy gage

and thin walled tubes can be straightened. Simple adjustment of the rolls permits straightening tubes, without changing rolls, within ⅛ to 9⅞ in. tube diam. *Henry A. Spittler.*

For more data circle No. 22 on postcard, p. 123.

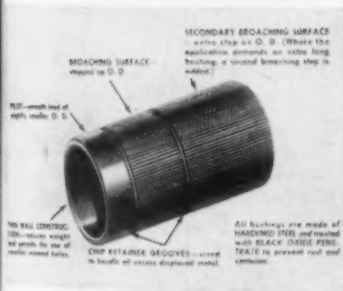


Pallet trucks feature motor-in-wheel drive

In the Powrworker lift-truck line are pallet trucks, electric battery-powered, with a capacity rating up to 6000 lb. Pallet forks can be supplied to handle any size pallet, either single or double faced. Walk-it or ride-it models feature double hoisting cylinders for lifting the loaded pallet, motor-in-wheel drive, full time delay control

with all contactors interlocked for smooth, progressive speed positions, positive safety-spring return handle which applies brake and cuts off power, and a bumper guard located higher to avoid operator injury. Models are arranged for single or double tray layout of battery. *Clark Equipment Co.*

For more data circle No. 23 on postcard, p. 123.

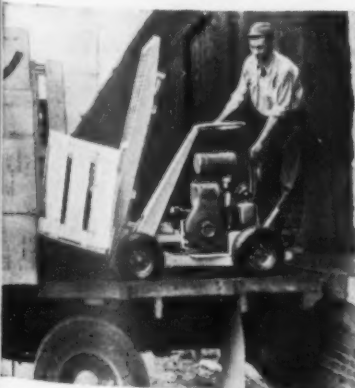


Broach-fit bushing eliminates precision drilling

The bushing with its broached outer surface which creates dozens of hard-cutting edges actually cuts its way into cast metal, plastic, steel and other metals without danger of collapse or cracking the parent metal. This feature eliminates the need for costly precision drilling.

A smooth surfaced, slightly undersized pilot on one end slip fits into standard sized hole to provide accurate lead and prevent cocking. Chip retainer grooves gather displaced metal as the bushing enters the hole; creates a lock which holds firmly. *Aeroquip Corp.*

For more data circle No. 24 on postcard, p. 123.



Truck for efficient material handling

The Xpediter material handling truck, which combines convenience of the hand truck with utility of power and speed is designed for handling boxes, barrels, drums, L.C.L. freight, castings, machined parts, etc. Its compact construction, small turning radius and front wheel steering enables it to move through narrow aisles and crowded areas. Lightweight permits use on

elevators and floors where heavy units cannot operate. The driver rides on pedal platform. Forward, reverse and speed are controlled by pressure of the operator's foot on a single pedal. The truck is offered in six models, hydraulic and manual lifts, to handle materials up to 800 lb. *Kalamazoo Mfg. Co.*

For more data circle No. 25 on postcard, p. 123.

Turn Page

make light
of
your heavy loads

handle them
"THRU-THE-AIR"



Capacities
up to
15 Tons.



How much does materials handling add to your production costs? Along assembly lines? Around machine tools? On loading platforms? In and out of storage? Handling materials is the largest single cost item in most plants. Start licking it now!

Thousands of plants have found the answer to efficient movement of materials with this quick, effortless, low cost way — "thru-the-air" with P&H Hevi-Lift Hoists. You merely press buttons to whisk loads from one station to another — no strain on skilled hands, no floor

congestion, no costly delays. With P&H's full magnetic push-button control, you can also have variable speed where needed.

P&H Hoist Engineers have helped solve hundreds of problems like yours. They can show you how to save money — in the places where most money can be saved.

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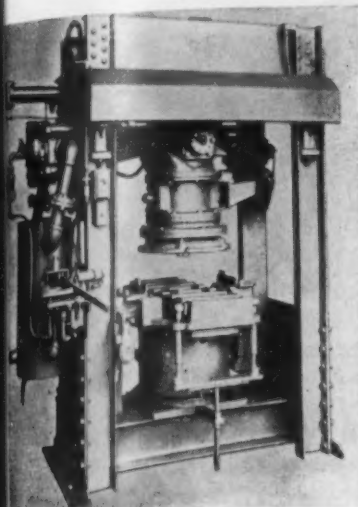
MILWAUKEE 46, WISCONSIN

the **P&H** Line



New Equipment

Continued



Fast core blower

A foundry machine will blow and draw eight cores in a box with a 5½ sec machine cycle. A fully automatic cycle control is accomplished by a hydraulically controlled air timer, which is so simple that an unskilled operator can operate the machine. Core blowing cycle can be infinitely controlled. Hard chrome-plate valve seats protect the timer from corrosive foreign matter in the foundry air lines. Large throat opening permits smoother flow of sand from supply hopper into the throat of the machine, eliminating danger of clogging. The Demmler 103 is compact, sturdy structural steel construction; all parts are accessible for quick maintenance. *Wm. Demmler & Bros.*

For more data circle No. 26 on postcard, p. 123.

Heat checking tests

Thermo-Test is a new tool for determining the resistance of steels to heat checking. Test pieces are successively heated, stressed and cooled. This cycle is repeated until the specimen develops visible cracks or heat checks. The number of cycles required to produce heat checks are indicated on a counter attached to the machine. As many as 18 test pieces can be tested at one time. Thermo-Test measures 24 in. wide x 36 in. long x 18 in. high. *Henry G. Keshian.*

For more data circle No. 27 on postcard, p. 123

Flexible tubing

Made of a rust-resistant wire helix covered with high-count woven fabric coated with a tough resinous compound, Flexflyte Green Label is a lightweight tubing with relatively smooth bore and negligible reduction of cross-sectional area in tight bends. It has good resistance to oils, gasses, acids, alkalis and abrasion. Has good aging qualities and is flame resistant. Fifty-foot lengths are available from 1 to 2½ in. diam, in ½ in. increments. *Flexible Tubing Co.*

For more data circle No. 28 on postcard, p. 123.

Rubber-like coating

Cycloflex No. 7731, a specially formulated, plastisol to meet Army Ordnance Specifications, is a free-flowing, viscous liquid which, with heat, is converted into a flexible rubber-like coating. When applied to component metal parts a smooth, dense, tough, highly abrasion resistant, resilient, rubber-like coating is obtained. Application is by dipping and heat conversion. Coating has excellent chemical resistance; will not harden, check or craze on aging. *Munray Products, Inc.*

For more data circle No. 29 on postcard, p. 123.



Ultra-violet lamp

Operating on 110 ac derived from one 6-v battery, Mineralight M-12, a portable self-contained ultra violet light can distinguish a mineral by its distinctive color response. It has a built-in flashlight with a 2-way switch for either white or ultra-violet light. The tube is permanently efficient pure fused quartz. It will burn for 1500 or more hours of use. *Radiac Co., Inc.*

For more data circle No. 30 on postcard, p. 123.

Turn Page

P&H OVERHEAD CRANES



Electrically Better, Too!

Structural strength? You can take that for granted. But look closely to the electrical equipment. That's the important factor in overhead crane service. That's why P&H builds its own electrical equipment — designed exclusively for crane operation, not adapted for it. Experience is the reason for P&H leadership — experience in building and servicing more than 18,000 electric cranes — far more than any other. You make no mistake when you let P&H build the entire crane — and take the complete responsibility for service.

Write for
Bulletin C-6

P&H OVERHEAD
CRANE DIVISION

HARNISCHFEGER
CORPORATION
MILWAUKEE 46, WISCONSIN

P&H MAGNETORQUE®
AC Crane Control provides
the finest known speed-
load characteristics.

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Fingertip heat control

right at the work—with the

P&H Welding Twins

equipped with Dial-lectric Control



Dial-lectric Control is an exclusive P&H feature that helps you weld faster, easier, better — at less cost

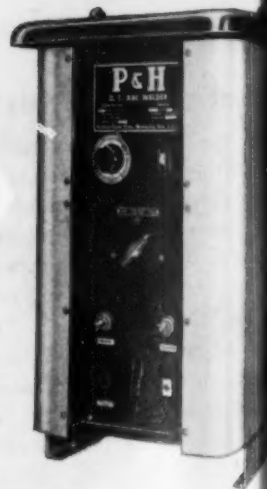
P&H AC WELDER



As easy as tuning your radio — just turn the radio-type knob of the Dial-lectric Instantaneous Remote Control (or step on a foot treadle), to adjust heat accurately. Easy, quick-start arc. No hard-working cranks to turn. No moving parts to cause delays or maintenance expense. Sizes up to 625 amps., NEMA rated. Connectable to 220 and 440 volts.

P&H DC RECTIFIER WELDER

Also equipped with hand-or foot-operated Dial-lectric Control, to give the welder fingertip heat control at the work. No hard-working cranks to turn. No moving parts to wear out. Saves on power costs under load — and during idle and no-load periods. Protects the primary input line against unbalanced conditions. Three sizes, 200, 300, and 500 amps., NEMA rated.



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HARNISCHFEGER
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the **P&H** Line

TRUCK CRANES

DIESEL ENGINES

POWER SHOVELS

PRE-FABRICATED HOMES

ELECTRIC HOISTS

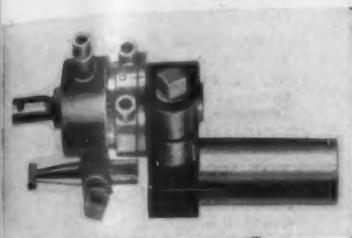
SOIL STABILIZERS

WELDING EQUIPMENT

OVERHEAD CRANES

New Equipment

Continued



Recessing tool

By having its adjusting screws incorporated in completely functional positions the new R & L recessing tool provides fine adjustment for depth or diameter of recess in the simplest operation possible. The tool can be adjusted to operate on outside diameters for cutting grooves, chamfering, or cutting clearance at ends of threads. It also can be adjusted to operate on any internal diameter within the capacity of the machine. *R & L Tools*

For more data circle No. 31 on postcard, p. 123.

Magnetic starters

A new line of magnetic starters, contactors and relays incorporates a simple 5-unit construction designed to install easier, work better, last longer. The five independent parts consist of two contact blocks, a magnet coil, an armature and a 3-coil or 2-coil overload relay mounted on a steel panel. Each part can be removed from the front without disturbing another part. The new line features a 3-coil, adjustable overload relay permitting four ratings from each heater coil by changing its position. *Cutler-Hammer, Inc.*

For more data circle No. 32 on postcard, p. 123.

Vacuum gage

To measure absolute pressures from atmospheric down to 0.0001 mm, the type 511 Alphatron (R) vacuum gage is available. Principle of operation is related to the conventional hot filament ionization gage. The important difference is that the Alphatron gage employs a shielded radioactive source instead of a hot filament. Alpha particles ionize the gas. Ionization current produced is measured by a dc amplifier which is calibrated to give absolute pressure in millimeters of mercury. *National Research Corp.*

For more data circle No. 33 on postcard, p. 123.

Carbide hone

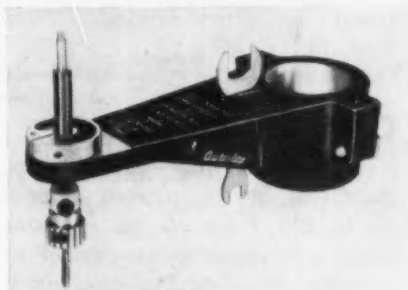
On-machine sharpening of single-point tungsten carbide tool using a new hand hone is claimed to result in 30 pct longer between-grinds tool life. At first signs of tool dullness, the user merely applies a few light strokes over the tool edge, holding the hone flat against surface so as not to round cutting edge or change relief angle. Hone quickly and effectively touches up tool while mounted on machine. Made from silicon carbide, the new hone is bonded with XL vitrified bonding process. *Chicago Wheel & Mfg. Co.*

For more data circle No. 34 on postcard, p. 123.

Dimetric graph sheets

Sketching sheets for axonometric drawing are based on exact mathematical calculation. They are a fine translucent vellum and the plate is printed in "invisible ink" so that the lines may be readily followed when sketching, but will not reproduce in blueprints or black and white prints. *John R. Cassell Co.*

For more data circle No. 35 on postcard, p. 123.



Tapping attachment

Reduced tap breakage is claimed for an improved lead screw tapping attachment for use on a standard drill press, that will take the tapping load off the tap and leave the tap free for thread cutting only. The manufacturer states that the precision rolled thread lead screw, and adjustable split-nut in which it works, carries the driving load, whether applied by an unskilled operator or by other driving force. A new type arm is aluminum cast in a pressure mold for utmost strength and precision; the clamp is reamed for perfect fit. *Automatic Methods, Inc.*

For more data circle No. 36 on postcard, p. 123.

Turn Page

P & H

Welding Equipment

speeds production
schedules, cuts costs

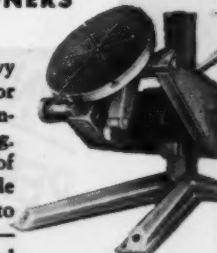
P & H LOW-HYDROGEN ELECTRODES



13 types for high-strength welds on problem steels, steel castings, nickel-alloy steels, chrome-moly steels, .40 carbon castings, high-hardenable steels, aircraft and similar steels.

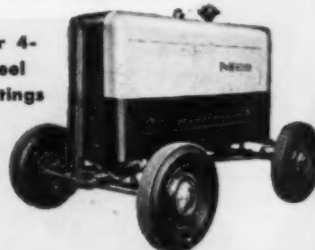
P & H POSITIONERS

Position heavy weldments for economical down-hand welding. Complete range of sizes to handle work from 2500 to 36,000 lbs. — remote-control and hand-operated models.



P & H WN-301 Engine-Driven DC ARC WELDER

2- or 4-
Wheel
Mountings



Portable. Equipped with Dial-electric Control, for fingertip heat control at the work — gives you faster, better welding. Runs at only 1750 rpm. Welding service range, 60-375 amps, NEMA rated.

Ask your P & H representative or distributor for complete information, or write for free bulletins.

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TONNAGE
PER EDGE**

A

**AMERICAN
SHEAR KNIFE CO.**
HOMESTEAD • PENNSYLVANIA

New Equipment

Continued

Pressure lubricant

Molybde Anti-Seize is highly concentrated molybdenum disulfide compound which will not melt even at temperatures above 600°F. It is suitable for extreme pressure applications such as are encountered in machine tools and automatic production machines. A homogenizing process and the use of special synthetic additives make it possible for Anti-Seize to remain in suspension longer than dry molybdenum disulfide when mixed in machine and cutting oils. It protects against corrosion besides preventing seizing and galling at bearing pressures over 100,000 psi. *Bel-Ray Co., Inc.*

For more data circle No. 37 on postcard, p. 123.

Bushing driver

A new production tool for driving threaded inserts for aircraft and general applications provides automatic positioning of the inserts to the proper depth below the face of the casting. A ball bearing pressure plate prevents backing the insert out after driving. *Titan Tool Co.*

For more data circle No. 38 on postcard, p. 123.

Cutting electrode

New 5-in-1 cutting electrode cuts, chamfers, bevels, pierces, gouges up to 2½ times faster at same heats. It requires no oxygen or acetylene or other fuel gas. It is applicable on steel, iron, copper, nickel with ac or dc. Only disadvantage is that the new faster electrode throws 2 pct more splatter. Sizes from 3/32 to ¼ in. *All-State Welding Alloys Co., Inc.*

For more data circle No. 39 on postcard, p. 123.

Boiler water treatment

Borgana is a new treatment said to end boiler scale and corrosion troubles. By adding 1 qt of the product per 100 hp per week, complete boiler treatment is obtained. Existing scale is softened and gradually removed. It can treat cooling water in refrigeration and air conditioning systems. *Strong, Carlisle & Hammond Co.*

For more data circle No. 40 on postcard, p. 123.

Turn Page

ATLANTA, Ga., Alpine 4885
Morrison-Drabner Steel Co., Inc.

BALTIMORE, Md., Peabody 7300
Hill-Chase Steel Company of Maryland

Asheboro, N.C., Phone 8849
Richmond, Va.: Phone 7-4573

BEAUMONT, Tex., Phone 4-2641
Standard Brass & Mfg. Co.

CHICAGO METROPOLITAN AREA
Korhmel Steel & Aluminum Company
Evanston, Ill.: Ambassador 2-6700

CINCINNATI, Ohio, Wabash 4480, 4481
Morrison-Drabner Steel Co., Inc.

CLEVELAND, Ohio
Nottingham Steel Company
Atlantic 1-5100
Copper & Brass Sales, Inc.
Endicott 1-6757

DALLAS, Tex.
Delta Metals, Inc.
Hunter 7446
Earle M. Jorgensen Co.
Riverside 1761

DAVENPORT, Iowa, Phone 3-1893
Nichols Wire & Aluminum Co.

DETROIT, Mich.
Copper & Brass Sales, Inc.
Lorain 7-3380

HONOLULU, T. H., Phone 5-2541
Permanente Cement Co.

HOUSTON, Tex.
Standard Brass & Mfg. Co.
Preston 1123
Earle M. Jorgensen Co.
Orchard 1621

INDIANAPOLIS, Ind.
F. H. Langenkamp Company
Imperial 4321
Korhmel Steel & Aluminum Company
Franklin 5361

KANSAS CITY, Mo., Victor 1041
Industrial Metals, Inc.

LOS ANGELES, Calif.
Eureka Metals Supply Company
Mutual 7286
Earle M. Jorgensen Co.
Lucas 0281
Reliance Steel Company
Adams 3-3193

MILWAUKEE, Wis., Evergreen 4-6000
Korhmel Steel & Aluminum Corp.
of Wisconsin

MINNEAPOLIS, Minn.
Korhmel Steel & Aluminum Company
Gladstone 5943, Prior 4030

NEW ORLEANS, La.
Orleans Steel Products Co., Inc.
Raymond 2116
Standard Brass & Mfg. Co.
Aud. 1353

NEW YORK METROPOLITAN AREA
A. R. Purdy Co., Inc.
Lyndhurst: Rutherford 2-8100
New York: Chelsea 3-4455
Newark: Humboldt 2-5566

OAKLAND, Calif.
Gilmore Steel & Supply Company
Glencourt 1-1680
Earle M. Jorgensen Co.
Higate 4-2030

OMAHA, Nebr., Atlantic 1830
Gate City Steel Works

ORLANDO, Fla., Phone 7124
Robinson Bros., Inc.

PHILADELPHIA, Penna., Delaware 6-5400
Hill-Chase & Company, Inc.
Allentown: Allentown 28077
York: York 5790

PHOENIX, Ariz., Phone 8-5331
Arizona Hardware Co., Inc.

PITTSBURGH, Penna., Hamlock 1-5083
Follansbee Metal Warehouses

PORT ARTHUR, Tex., Phone 5-9377
Standard Brass & Mfg. Co.

PORTLAND, Ore., Tuxedo 5201
Eagle Metals Inc. of Oregon

SAN FRANCISCO, Calif., Klondike 2-0511
Gilmore Steel & Supply Company

SEATTLE, Wash., Lander 9974
Eagle Metals Company

SHREVEPORT, La., Phone 2-9483
Standard Brass & Mfg. Co.

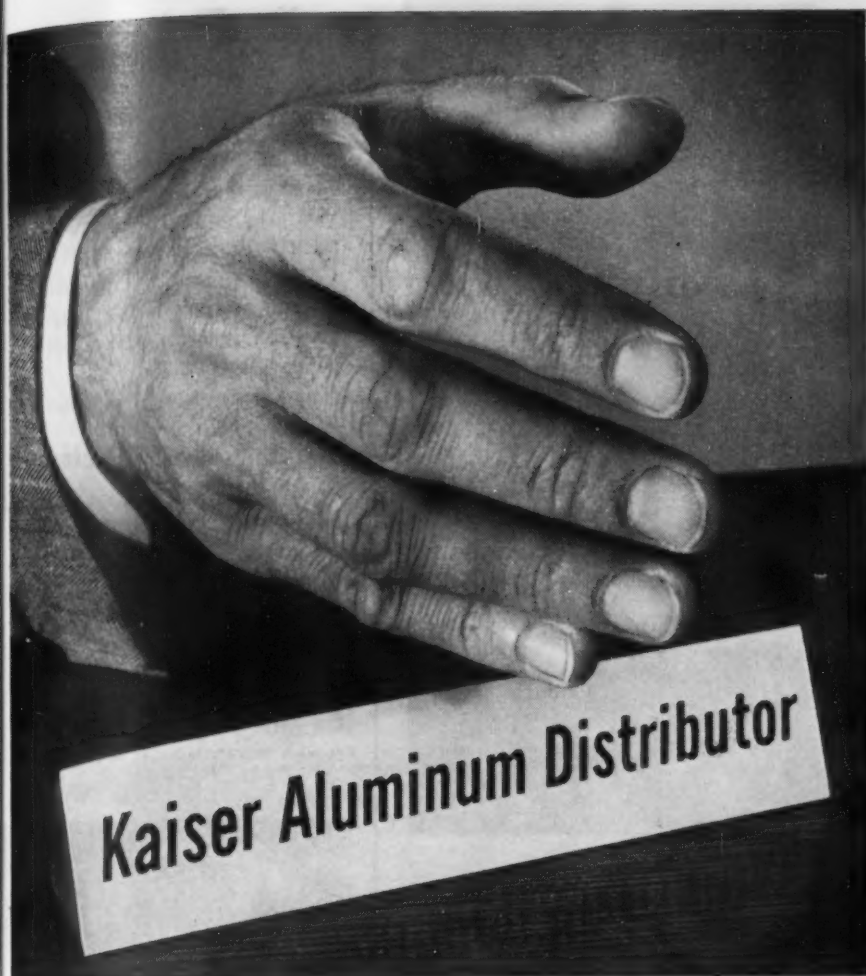
SPOKANE, Wash., Madison 2419
Eagle Metals Company

ST. LOUIS, Mo., Lucas 0051-2-3
Industrial Metals, Inc.

SYRACUSE, N. Y., Enterprise 6400
A. R. Purdy Co., Inc.

WICHITA, Kans., Phone 7-1208, 7-1209
General Metals Incorporated

WORCESTER, Mass., Worcester 7-4521
Merrill Aluminum Corporation



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WHY NOT meet your Kaiser Aluminum Distributor soon—and take full advantage of his many services, as countless others do.

You'll appreciate the friendly, personal attention he gives to your requirements, even on the smallest order, whether the market is tight or soft.

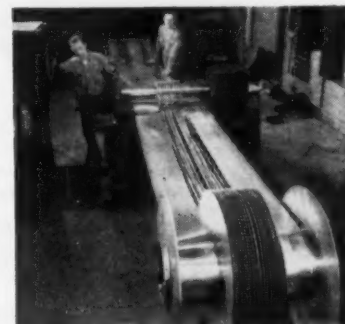
You'll profit from his practical solutions to your problems—backed by his specialized knowledge and long experience. You'll be kept abreast of latest developments, obtain suggestions for improved production methods, have

your purchases checked to give you maximum value.

You'll receive assistance obtaining allotments for experimental work and for emergencies. You'll be kept posted on government requirements, to help you get more sub-contract jobs.

And you may, even now, be able to get from him the aluminum you need. For Kaiser Aluminum has greatly increased its output—will soon have expanded its production capacity of primary aluminum 137%.

Pay an early visit to your nearby Kaiser Aluminum Distributor.



LOWER RAW MATERIAL INVESTMENT—Slit, sheared, or sawed stocks to fit every production demand can be delivered to you daily. Eliminates expense of idle or obsolete inventory.



SMALLER SPACE REQUIREMENTS—Small lot purchases mean less space is needed to house raw materials. Result: you can devote more space to profitable production.

◆ Your nearest Kaiser Aluminum distributor is listed at the left. Call him TODAY.

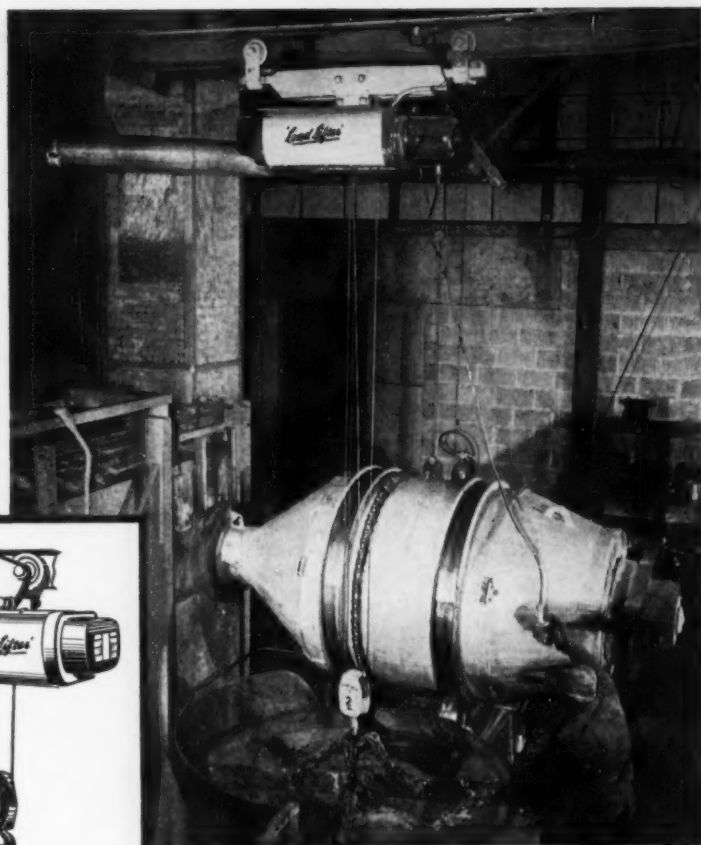
Kaiser Aluminum

Setting the pace . . . in growth, quality and service

PRODUCERS OF: Sheet • Coil • Plate • Pig • Ingot • Billet • Foil • Electrical Conductor
Residential Siding • Corrugated Farm and Industrial Roofing • Shade Screening • Rod, Wire & Bar
Screw Machine Stock • Forging Stock • Rivet Wire • Roll-Formed Shapes • Extrusions

February 5, 1953

135



EASY DOES IT!

'Load Lifter' SPEEDS TOUGH HANDLING

THE "SERIES 700" 'LOAD LIFTER' HOIST is the one electric hoist you can depend on for continuous service to keep defense and civilian production on the move. It's a heavy-duty hoist, built for 3-shift lifting every day in the year.

IT'S FAST AND ECONOMICAL — Shortens handling time — lifts a ton 30 feet a minute. Costs go down when the 'Load Lifter' does all the heavy work.

IT'S TOUGH AND SAFE — The 'Load Lifter' has every feature to safeguard man, load and hoist. Only 24 volts at the push button. Powerful motor and load brakes that act simultaneously. Steel suspension. No exposed wiring. Over-capacity load hook.

IT'S BUILT TO LAST — Heat-treated helical gearing provides greater strength. Ball bearings throughout minimize frictional wear. The 'Load Lifter' is constructed with few parts to assure trouble-free service.

SAVE IN YOUR PLANT — Wipe out muscle strain and maintain worker efficiency. Give your production a lift at the same time. 'Load Lifter' capacities range from 1/2 ton up. Ask your "Shaw-Box" Distributor for details or write for Bulletin 399.



'Load Lifter' ELECTRIC HOISTS

MANNING, MAXWELL & MOORE, INC.
MUSKEGON, MICHIGAN

Builders of "Shaw-Box" and 'Load Lifter' Cranes, 'Budgit' and 'Load Lifter' Hoists and other lifting specialties. Makers of 'Ashcroft' Gauges, 'Hancock' Valves, 'Consolidated' Safety and Relief Valves, and 'American' Industrial Instruments.

New Equipment

Continued

Aluminum roofing

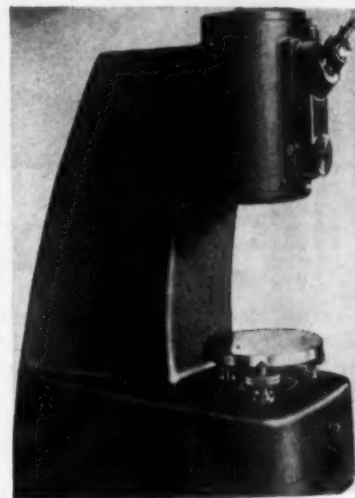
Cross crimped aluminum roofing is being produced in three popular types: 1 1/4 in. corrugated, 5-V crimp and 2 1/2 in. corrugated. It is said to be more rigid, has fine reflective qualities with less glare and eliminates unsightly end or side laps. *Quaker State Metals Co.*

For more data circle No. 41 on postcard, p. 121.

Glass welding helmet

New Saf-I-Weld welding helmet is made of fiber glass which has great strength-weight ratio. The Saf-I-Weld is strong and durable but very lightweight. Fiber glass is highly resilient, will not split, crack, or deform. Helmet is adjustable to fit any head size. *U. S. Safety Service Co.*

For more data circle No. 42 on postcard, p. 121.



Auto-Collimator

For the precise measurement of angles, parallelism and surface quality of metals, plastic, or glass, a new Jackknife auto-collimator can be used in routine machine and optical shop operations with an accuracy said to be greater than 6 sec. No special operating skill is needed. The collimator is used directly against any surface which reflects a beam of light. Folded optical path permits all components of the instrument to be housed in a single rugged casting. *Perkin-Elmer Corp.*

For more data circle No. 43 on postcard, p. 121.

The *Iron Age*

SALUTES

W. Stewart Scott

Almost 30 years' experience have made him an expert on pig iron, with a robust sense of humor.



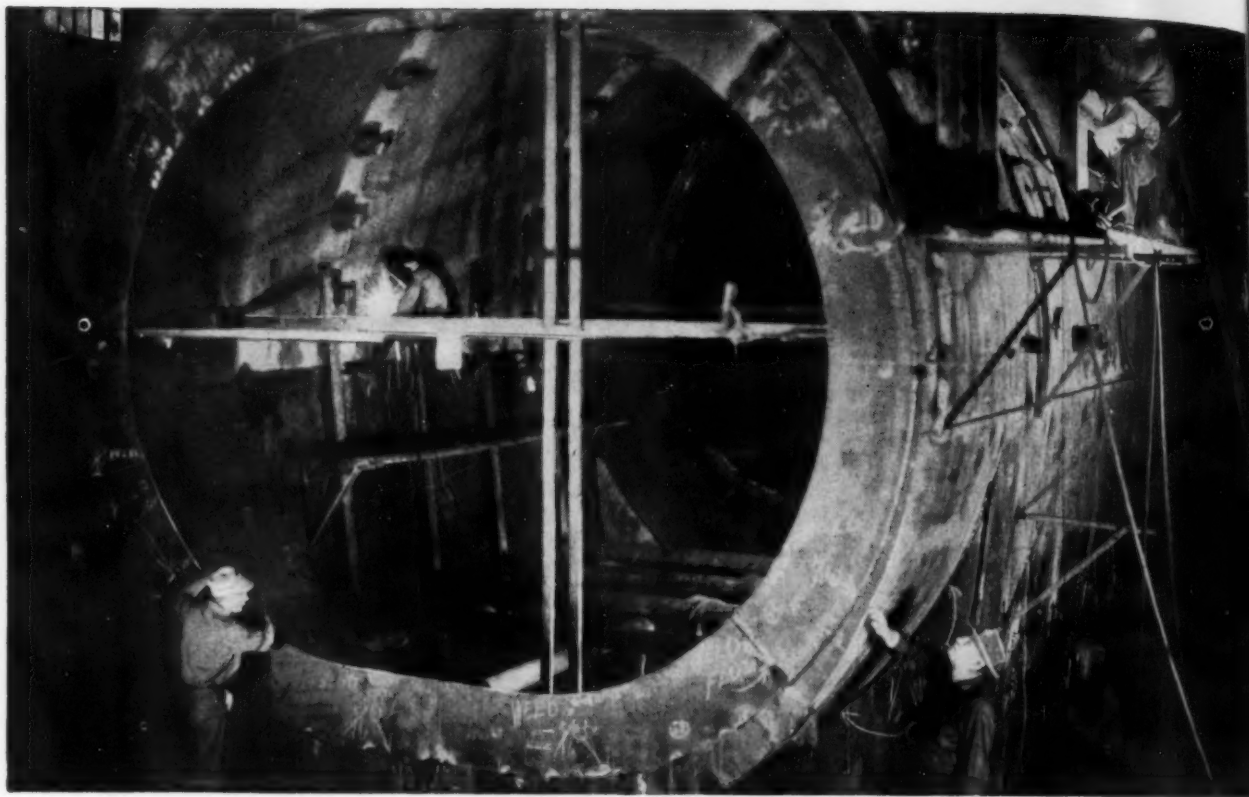
TO hear him tell it, "Scotty" Scott is a har-r-r-d man. But those who know him best aren't taken in by the masquerade. There is more iron in his manner than in his heart.

Speaking of iron, Scotty has been selling it for nearly 30 years. The affectionate nickname, "Pig Iron" Scott has been well-earned. Well-earned, too, is his job of vice-president—sales, Pittsburgh Coke & Chemical Co. This is his 25th year with Pittsburgh Coke, which itself is celebrating its Silver Anniversary.

Scotty, who took his first job in the iron industry in 1923, is an acknowledged authority on pig iron. The Government took advantage of this during World War II, when he served on the Industry Advisory Committee for Pig Iron of the War Production Board. He now serves on similar committees for National Production Authority and Office of Price Stabilization.

Scotty has no time for hobbies, as such. He does play a good game of golf when he sets his mind to it. Otherwise he relaxes by needling friends, fellow workers and even customers with fine impartiality. Incidentally the checkered vest showing in the above picture is not his usual attire. He was wearing it as a gag when the picture was taken.

The Scotts live in Bethel Borough, a Pittsburgh suburb. Their married daughter is the mother of the only two people who can tell Scotty anything about "pigs going to market."



This formula helps an entire industry!

More and more firms in the chemical industry are coming to rely on this formula:

Barium Steel Corporation—best source for structural and steel plate, fabricated forms and finished products of steel, aluminum, magnesium, Fiberglas, plastics.

The reason for this conviction is that the group of strategically located companies comprising Barium Steel Corporation serves the chemical industry as a *unified* source for its structural and equipment requirements, controlling quality from blast furnace to end product, working as

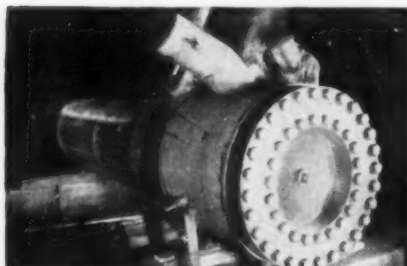
a self-contained supplier of urgently needed material.

For example, in the scene above, workers at Barium's Central Iron and Steel Company are building a giant condenser shell from Central plate, which is also fabricated into tanks, heat exchangers and piping for the process industries. Other Barium subsidiaries (see photos below) supply the chemical field with a number of important components.

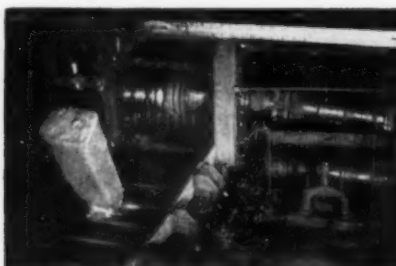
Whatever your industry, Barium can provide you with the same kind of service. For details, write Barium Steel Corporation, 25 Broad Street, New York City. No obligation.



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THE HEAD of this Lummus Co. heat exchanger unit is securely fastened by bolts and studs specially made by Barium's Erie Bolt and Nut Co. Specialty studs for the industry are also produced by Barium's Bayonne Bolt Corp.



THIS INGOT in the blooming mill at Phoenix Iron and Steel Co. will ultimately become structural steel, which is widely used in the chemical industry for the construction of new processing equipment.



HEAT EXCHANGER manufacturers like Griscom-Russell Company take heavy forgings of Barium's Industrial Forge & Steel, Inc., and fabricate them into parts that resist temperature, high pressure, and the corrosive action of chemicals.

The Iron Age

INTRODUCES

Robert S. Solinsky, elected president and a director of NATIONAL CAN CORP.

Gilbert C. Strege, appointed president, THE BAKER-LULL CORP., Minneapolis, newly acquired subsidiary of The Baker-Raulang Co.

Dwight A. Bessmer, elected a vice-president, TIMKEN ROLLER BEARING CO., Canton, Ohio.

Luther H. Bosnian, named vice-president in charge of manufacturing facilities, CHAIN BELT CO., Milwaukee; Lyman Newton, elected controller; and F. D. Tincknell, made assistant treasurer.

Ralph W. Seely, named vice-president and general manager, Consolidated Western Steel Div., U. S. STEEL CORP.

Clark E. Center, appointed vice-president in charge of atomic energy work, CARBIDE & CARBON CHEMICALS CO., a division of Union Carbide & Carbon Corp., New York.

Ross S. Anderson, elected a vice-president, INGALLS IRON WORKS CO., Birmingham.

Warren E. Hill, elected to new post of vice-president in charge of operations, EMHART MFG. CO.

J. C. Hicks, appointed vice-president, HARVEY HUBBELL, INC., Bridgeport, Conn. He succeeds Emmet K. Moore, who has retired.

Matthew J. Betley, elected vice-president, AEROQUIP CORP., Jackson, Mich.; and George Fischer, also elected vice-president.

Nathaniel K. Zelazo, appointed vice-president, KETAY MFG. CO., New York.

Robert B. Algie, appointed assistant vice-president - sales, PITTSBURGH SCREW & BOLT CORP., Pittsburgh.

R. A. Armstrong, appointed executive vice-president, MICHIGAN SEAMLESS TUBE CO., South Lyon, Mich.

John V. Banks, appointed vice-president in charge of manufacturing, Automotive Div., KAISER-FRAZER CORP., Willow Run, Mich.

Carl E. Schmitz, named vice-president in charge of sales, CRANE PACKING CO., Chicago.

Edward J. England, promoted to vice-president in charge of operations, CHICAGO FREIGHT CAR & PARTS CO.

Edward J. Mogol, made secretary and treasurer and general manager, JOHN B. ASTELL & CO., INC., New York.

Charles E. Wilson, elected chairman of the executive committee of the board of directors, W. R. GRACE CO., New York.

Robert N. Bayless, named director of management planning, CALUMET & HECLA, INC., Calumet, Mich.; and Edward C. Ames, made director of employee and public relations.

J. Fred Hedding and Harold E. Sweeney, elected new directors of FIRTH STERLING INC., Pittsburgh.

H. Robert Miller, appointed director of sales, WHITE METAL MFG. CO., Hoboken, N.J.; and Charles Stiassni, elected secretary.

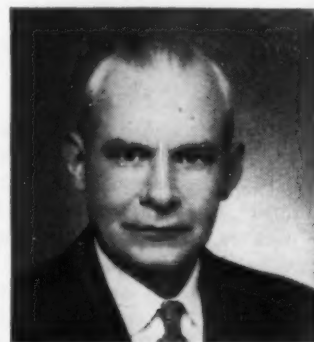
George Breyer, appointed metallurgical service engineer, Detroit, CRUCIBLE STEEL CO.

John H. Wintersteen, transferred to Bristol, Pa. plant as manager of public relations and advertising, HENRY J. KAISER CO.

Allen C. Staley, Jr., has been named assistant general manager of sales, AMERICAN CAN CO.



H. C. ALLINGTON, elected vice-president—sales, Eastern Div., The Colorado Fuel & Iron Corp., N. Y.



JAMES M. WHITE, elected vice-president—manufacturing, American Car & Foundry Co.



C. L. BAYER, elected vice-president and assistant manager—operations, Great Lakes Steel Corp.



Headquarters for

52100

Steel Tubing and Bars

**Largest
Stocks
in
the
Country...**

of this versatile steel. 52100 is hard, tough and long-wearing, yet it's easy to machine and is right for bearings, sleeves, pins, collars and many other machine parts.

Over 200 seamless tube sizes to choose from .898" O.D. to 8.250" O.D. Bar sizes from .171" round to 7.5" round. Also ring forgings in any analysis.

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Personnel

Continued

R. H. Zeilman, made director of engineering, **THE THEW SHOVEL CO.**, Lorain, Ohio; **M. L. Sheetz**, named chief executive engineer; and **O. Von Mehren**, becomes chief design engineer.

W. Richard Means, elected director, **MARSH STEEL CORP.**

E. Q. Smith, appointed manager, **FRUEHAUF TRAILER CO.**, Avon Lake, Ohio plant.

Dr. Herman Bruson, named head of organic chemical research, **OLIN INDUSTRIES**, East Alton, Ill.; **Melvin M. Johnson, Jr.**, becomes manager of armament research; and **Hibben Ziesing**, made head of petrochemical research.

J. A. Robinson, made field sales manager, Industrial Div., **MINNEAPOLIS-HONEYWELL REGULATOR CO.**, Philadelphia.

Tom M. Neibling, appointed manager, Southwestern Div., **ARMCO DRAINAGE & METAL PRODUCTS, INC.**, subsidiary of Armco Steel Corp.; and **William O. Robertson**, named manager, Eastern Div., Baltimore headquarters.

John F. Shea, appointed general salesmanager, **BUFFALO ELECTRO-CHEMICAL CO., INC.**; and **Fred N. C. Jerauld**, named manager of sales promotion.

David S. Burnett, named sales manager, Automotive Div., **DETROIT STEEL PRODUCTS CO.**, Detroit, succeeding Samuel P. Hess, who is retiring.

E. A. Warren, appointed to sales engineering staff, **HONAN-CRANE CORP.**, Lebanon, Ind.

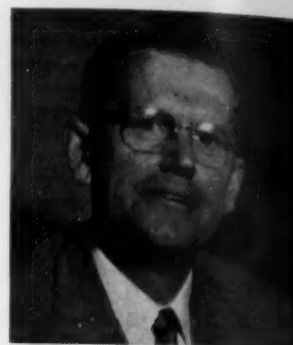
Richard D. Stanley, appointed district manager, Providence district sales office, **REVERE COPPER & BRASS INC.**, New York.

Philip C. Staples, appointed Chicago district sales manager, Industrial Chemicals Dept., **PENNSYLVANIA SALT MFG. CO.**, Philadelphia.

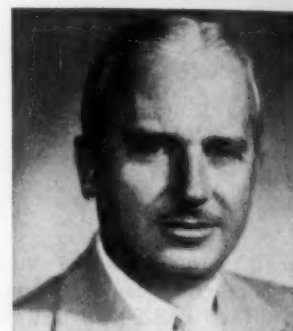
J. P. Caulfield, appointed general manager, Western Mining Div., **KENNECOTT COPPER CORP.**

S. H. Beach, promoted to industrial sales manager for the U.S. **IRON FIREMAN CORP.**, Cleveland; and **D. Paul Bailey**, named assistant sales manager.

Robert G. Lane, named general traffic manager, **THE NATIONAL RADIATOR CO.**, Johnstown, Pa.



RALPH E. KNIGHT, promoted to a vice-president, **Kaiser Aluminum & Chemical Corp.**, and also director of research and development, Aluminum & Chemical Div.



WILLIAM KERBER, named a vice-president, **Great Lakes Steel Corp.**



PAUL CARNAHAN, elected a vice-president—sales, **Great Lakes Steel Corp.**



NATE A. WADE, appointed executive vice-president, **Osco Steel Co.**, Cleveland.



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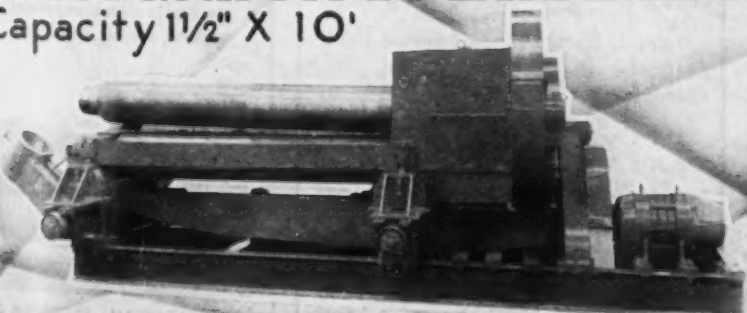
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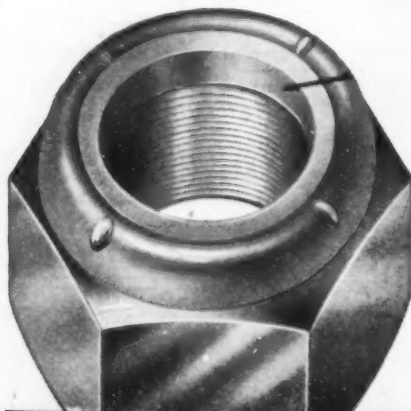
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Personnel

Continued

Walter C. Loeman, named production manager, Cleveland Valve Div., THE PARKER APPLIANCE CO.; and Robert C. Dyrenforth, named division engineer, with both product and process engineering responsibilities.

Richard H. Hammell, appointed service engineer, CHICAGO VITREOUS ENAMEL PRODUCT CO., Cicero, Ill.

Walter E. Palmer, promoted to sales manager, ALL-STATE WELDING ALLOYS CO., INC., White Plains, New York.

Ray G. Reynolds, promoted to advertising manager, CONTINENTAL STEEL CORP., Kokomo, Ind.

Edwin M. Close, appointed purchasing agent, THE HANSON-VAN WINKLE-MUNNING CO., Matawan, N. J.

Earl D. Foster, appointed superintendent of gas turbine production, Manufacturing Div., San Diego, SOLAR AIRCRAFT CO.

OBITUARIES

Edwin R. Motch, 51, president, Motch & Merryweather Machinery Co., Cleveland.

Clarence Snyder, 72, chairman of the board, Snyder Tool & Engineering Co. and its subsidiary, Arthur Colton Co., Detroit and Mancelona, Mich., at his winter home in Ft. Lauderdale, Fla.

George R. Weber, vice-president, treasurer and a director, Raybestos-Manhattan, Inc., and general manager of its U. S. Asbestos Div., plant in Manheim, Pa., at his home in Lancaster, Pa.

Frank O. Humberger, Jr., president and treasurer, The Massillon Steel Casting Co., Massillon, Ohio.

George G. Thorp, 84, former president of the old Illinois Steel Co., recently.

John J. Barth, 73, founder of Barth Stamping & Machine Works, Inc., Cleveland.

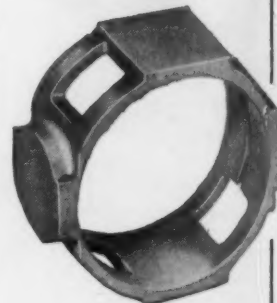
Dr. Charles H. Herty, Jr., 56, nationally known metallurgist and assistant to vice-president of Steel Div., Bethlehem Steel Co., recently.

P. J. McAuliffe, purchasing agent, Orange, Texas, plant of U. S. Steel Corp., Western Steel Div., of a heart attack recently.



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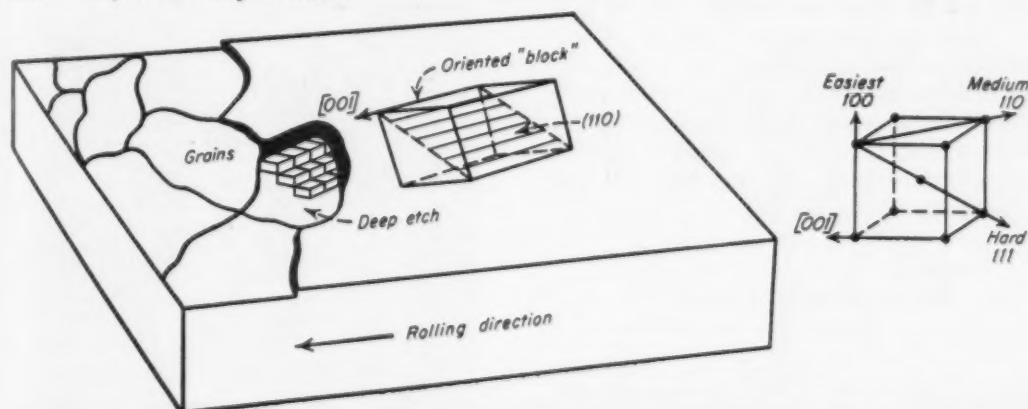
By N. P. Goss
Consultant
Mayfield Research Laboratory
Cleveland, Ohio

The quality of highly oriented polycrystalline-silicon steel with the same characteristics of a single crystal is constantly being improved. The desired permeability is closely tied to chemistry, non-metallics and processing sequence. Maximum permeability commercially available today is around 60,000. Laboratory experiments have produced permeabilities of 3.8 million in 6.4 pct silicon ferrite by heat treating the steel in a magnetic field. Commercial applications are growing fast. Transformer weights have been reduced as much as 50 pct. The potential tonnage of this type of silicon steel may have only been scratched.

♦ SILICON STEELS for electrical use have enjoyed a constant improvement through research and controlled production methods. The improvements which have been made over the past 45 years have been remarkable. The first significant improvement was made about 45

years ago when Hadfield of England discovered that the addition of silicon to substantially pure ferrite greatly improved the magnetic properties of the transformer core. At the present time, the best commercial grain-oriented silicon ferrite may reach a maximum

FIG. 1—The diagram of the body-centered cube illustrates the crystallographic directions. The [001] direction is parallel to the face of the cube. The schematic diagram shows the position of the ideal (110) [001] orientation in respect to rolling direction.



**Maximum permeability, 20 years
from now . . . will be substantially
better than it is today . . .**

permeability of 60,000. In 1935 15,000 was the best grade produced.

What the maximum permeability will be 20 years hence, cannot be predicted, however, it will be substantially better than today. Laboratory research on pure silicon ferrite has already yielded a 3,500,000 permeability. Any improvement made in the preparations of the silicon ferrite during melting, casting, and hot working is usually reflected in better grain-oriented silicon ferrite.

The quality of the grain-oriented strip depends in no small measure upon the chemistry of the melt, and the manner in which the heat is processed mechanically. In transformers 3 pct Si strip is the most widely used. Experience has clearly shown that the response of different heats of 3 pct silicon ferrite to the grain-oriented processes is at times quite erratic. Grain-oriented strip could not be processed from silicon ferrite as made in open hearths during the early years of this century. Its production became possible only since 1930, with steels that contain less metallics and about the proper ratio of metallics.

These elements must be cut

At the present time, the highest quality grain-oriented strip contains less than 0.005 pct C. To find easier and more certain methods to reduce the carbon to such extremely low limits, requires constant research. T. D. Yensen contributed many important improvements in the manufacture of silicon ferrite at the research laboratories of Westinghouse. His most important contribution was his experimental proof that the best magnetic properties are realized when the carbon is under 0.01 pct. It is also well known that when the carbon greatly exceeds 0.03 pct the magnetic properties are greatly reduced. Long experience has shown that the following elements must be reduced to the lowest possible value: carbon, oxygen, sulphur, and nitrogen. It has also been found that it is important that certain ratios must be maintained between these elements. There is good evidence that the carbon-oxygen ratio is extremely important, and the grain-oriented process appears to be dependent upon it.

THE AUTHOR—N. P. Goss

The author is considered by many as the man most responsible for developing grain-oriented silicon ferrites. Formerly employed by Cold Metal Products Co. and others, he is now consulting and operating his own research laboratory.

While only small amounts of non-metallic elements markedly reduce the magnetic quality of silicon ferrite, small additions or residuals of most metallic elements have either no effect or may be beneficial. Manganese may range from 0.1 pct to 0.5 pct, improving the ductility, and workability, especially during hot rolling. However, depending upon the amount of manganese present, a modification in the processing of the grain-oriented product may be required. The addition of manganese has been reflected in reduced processing costs.

It has been claimed that the addition of 0.05 pct V has resulted in reduced coercive force. However, the most significant effect of

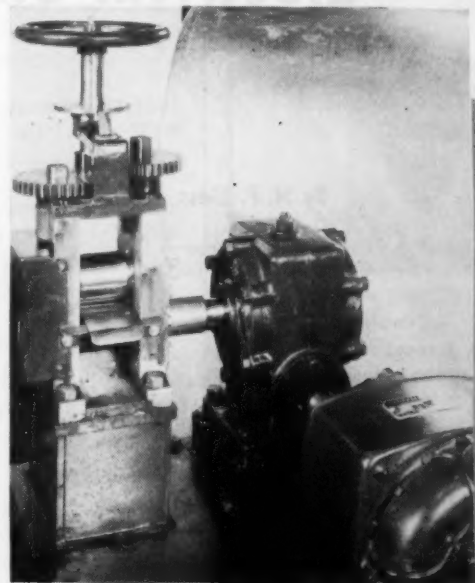
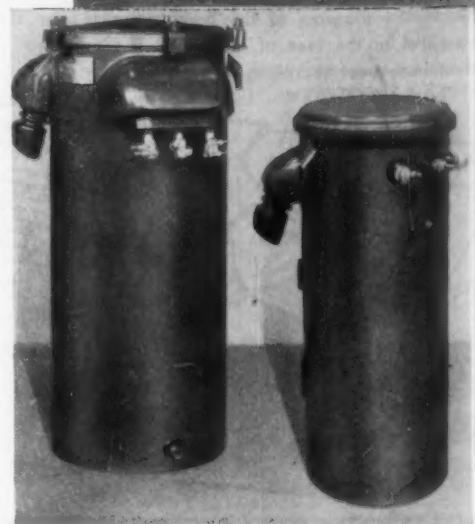


FIG. 2—Small hand mill on which experimental samples were cold rolled for development and testing purposes.

FIG. 3—Old-type distribution transformer at left weighs 505 lb and is 39 in. high. New Spirakore transformer using grain-oriental steel, shown at right, only weighs 335 lb and is 35 in. high. Courtesy General Electric Co.



such small additions to the silicon ferrite has been the increased response to recrystallization after cold rolling. While only a small amount of research on the effect of such additions has been reported in the literature, it appears that certain metallic elements, when added to silicon ferrite, may improve the final annealed product giving a greater certainty for the response to secondary recrystallization of the type (110) [(100)].

The magnetic properties of the single crystals of silicon ferrite depend on the direction in which the crystal is magnetized. These crystals can be magnetized most easily in the

[(100)] direction as shown in Fig. 1. Another way of expressing this is that only a small exciting current is required to magnetize this material to saturation. Because of this preference in orientation a method of producing the proper crystalline arrangement was needed.

During the period of 1930 to 1935 the author developed a method at the Cold Metal Process Company, in which the [(100)] direction of the grains lie in the direction of rolling. To develop this required the processing of many test specimens, rolled and heat treated in almost endless combinations, until the method was perfected. A photo of the small hand mill

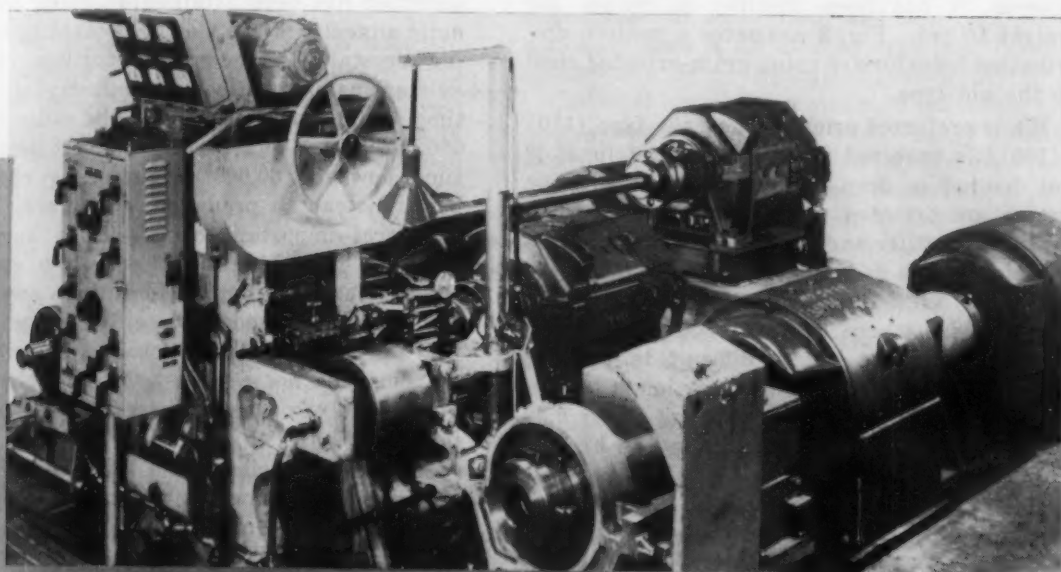
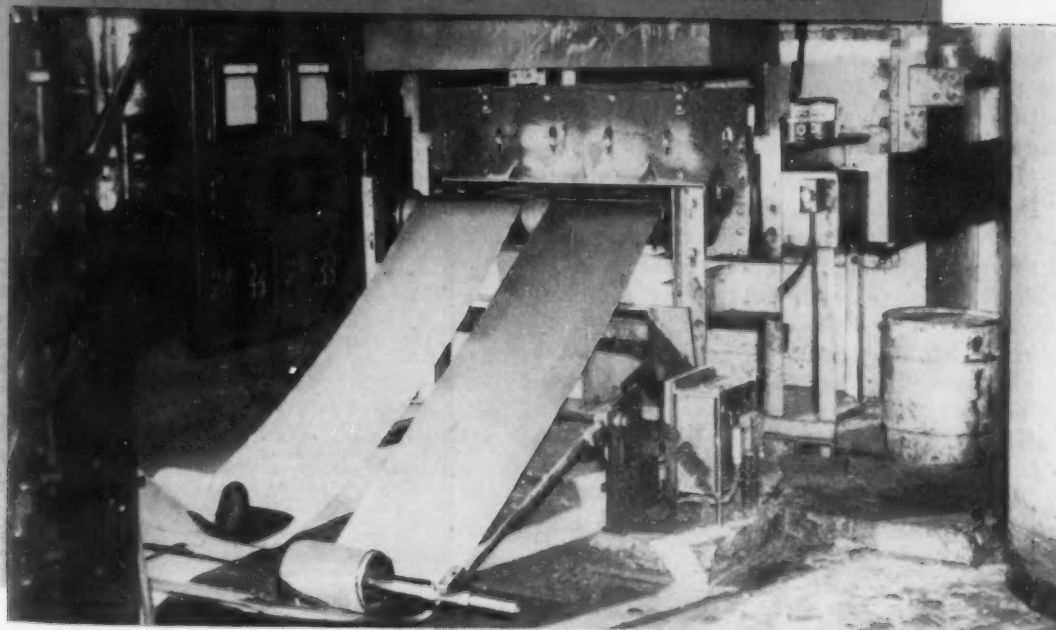


FIG. 4—New type 4-high reversing single stand cold mill which is particularly effective for producing intermediate and light-gage silicon ferrite. The mill drive is on the 15-in. diam backup rolls. Each of these rolls is driven by a 100-hp motor. Each reel is driven with a 75-hp motor. The 3-in. diam workrolls are tungsten carbide. Maximum speed of the mill is 1800 fpm. Courtesy of The Cold Metal Products Co.

FIG. 5—Silicon ferrite entering continuous-annealing furnace at Cold Metal Products Co.



"When the decarbonization treatment has been completed, the bath is worked to remove occluded gases, nitrogen and oxygen. . . . These are removed by passing hydrogen into the melt . . ."

on which much of the test rollings were done is shown in Fig. 2. A highly grain-oriented polycrystalline material has the same characteristics as a single crystal.¹ This property extends throughout the entire coil hundreds of feet long and the direction of rolling and the [(100)] direction of the grains coincide. As a result of this development, transformers could be made smaller and of reduced weight, and yet have the same rating. In some instances, it has been possible to reduce the weight 50 pct. Fig. 3 compares a modern distribution transformer using grain-oriented steel to the old type.

While preferred orientation of the type (110) [(100)] is required in transformer strip, it is not desired in deep drawing steels where the grains are oriented practically at random, so that the ductility and other physical properties associated with deep drawing requirements are about the same in all directions. Many obstacles arise where this material is produced in large tonnages. It is difficult to produce grain oriented strip having a maximum permeability of 50,000 and total losses of under 0.30 watts per lb. At the present time, the highest grades are found by selection.

Research and development continues at a high tempo, however, no precise methods have been worked out which can make each heat of steel respond 100 pct to the grain-oriented process. The product is being gradually improved by finding easier and better ways of removing the impurities at the various stages of processing.

Texture tied to chemistry

It has been definitely proven, however, that the response of the final cold-rolled strip to the development of the desired (110) [(100)] texture is tied up with the chemistry at each stage of processing. These stages of processing are listed in Table I.

The extent to which the grain-oriented process can be perfected in the years ahead can not be predicted. Pure research in the field of magnetic materials is indispensable, for it not only directs our attention to the ultimate, but oftentimes discloses new avenues of approach. Research at the Bell Telephone Laboratories has increased the permeability of a single crystal of 6.4 pct silicon ferrite from 50,000 to 3,800,000 in the [(100)] crystallographic direction when heat treated in the presence of a magnetic field. This permeability is the highest reported for any magnetic material and is a good yard stick for future progress.

Significantly the magnetostriction of the 6.4 pct silicon ferrite is nearly zero. Transformers made of silicon steel having low magnetostriction are very quiet in operation. Vibration due to magnetostriction can be a difficult problem in large transformers. High grade grain-oriented strip has very low magnetostriction, and the more perfect the (110) [(100)] texture, the lower the magnetostriction.

A permeability of 1,400,000 in the [(100)] direction has been attained by using the magnetic anneal and some estimate that by improving crystal alignment and further reducing deleterious impurities the industry should in time attain permeabilities of the order of 500,000 with lower total watt losses. At the present time however 60,000 maximum is about the best that can be produced in tonnage.

Several important contributions have been made in improving electrical strip steels in recent years. William Rohn and his co-workers made several important contributions in the field of melting.² They describe a method for reducing the nonmetallics, the oxides and sulphites, and the occluded gases during the melting operation.

They used ferrite of the highest purity as a starting material which was melted in a Rohn type induction furnace. The furnace atmosphere was nearly inert, but may be on the oxidizing side, under reduced pressure. The bath is decarburized by adding iron oxide in excess of the amount required by calculation. As the carbon is removed in successive steps, the pressure of the furnace is gradually reduced until the CO and CO₂ gases are removed to the lowest possible value.

When the decarbonization treatment has been completed, the bath is worked to remove the occluded gases, nitrogen, and oxygen. These are removed by passing hydrogen into the melt or over the surface, which can be stirred by

TABLE I
PROCESSING STAGES FOR SILICON
FERRITE

Process	Temperature
Melting and casting	1200° F to 1480° F
Hot rolling	210° F to 940° F
Cold rolling	1700° F
Box or continuous anneal	100° F
Ageing or stabilizing treatment	
Coating	

the induced currents. The flow of hydrogen is strong and is usually carried out under reduced pressures until the gases are eliminated to the desired value.

These residual gases may be removed by the well known calcium-silicon alloy. Rohn also suggests the use of mishmetal. The heating of the bath is continued for a time after these reducing elements have been added. When this operation has been completed, pure silicon is added to the bath. The amount added usually is in the range of 2.75 to 3.5 pct. If ferro-silicon is added instead of silicon, it must be of high purity. Experience has proven that it is important to add the silicon of high purity, otherwise contamination of the metal will result.

Rohn suggests that after the silicon addition, heating should be continued under reduced pressures until the silicon has been evenly distributed throughout the bath. Silicon ferrite refined according to the method described yielded a maximum permeability of 45,000 and a watt loss of 0.48 to 0.60 watts—this was not grain-oriented steel.

Hot-rolling step important

These excellent magnetic properties are due mainly to degasification and removal of the metalloids to the lowest possible value. Rohn also found that the addition of small amounts of copper, aluminum, zirconium and titanium have a beneficial effect upon the magnetic properties of the alloy. Had this material been processed according to well known procedures, which favor the development of the (110) [(100)] orientation texture in the rolling direction, much higher permeabilities would have resulted.

The hot-rolling operation is an important

step in the grain-oriented process. Research over the past 3 years has proven that the hot rolling and the melting and refining of the silicon steel are related. Best results are usually obtained when the finishing temperatures are under 1500°F. Depending upon the method of melting, the best results are obtained where the finishing temperature is in the range of 1200°F to 1450°F. Usually the mills favor the higher finishing temperatures in that less power is required to reduce the strip.

The best finishing temperature from the metallurgical viewpoint is the finishing temperature which will produce the best grain-oriented strip. The gage of the hot strip does not appear to be critical, and the gage most generally used is dictated by economic factors rather than by metallurgical considerations.

Chemical composition and cold reduction are closely related. A survey of the many patents issued on this point show some disagreement on proper cold-rolling temperatures but all claim that rolling temperature and chemistry are vital to obtaining the optimum orientation. Recommended rolling temperatures covered in these patents vary from a narrow range of 200°F to 400°F all the way to starting at 840°F and reducing the temperature on each pass.

One important requirement in the heat treating of electrical steels is to impart a uniform crystal texture over the entire length of the strip. This is done by cold rolling the annealed hot-rolled strip having the proper orientation texture down to about 0.030 in. in thickness. The 3 pct Si strip is usually annealed at 1700°F for one minute. Long experience has proven that strip rolled to 0.030 in. thick produces grain-oriented strip of the highest quality.



FIG. 6—Delivery end of the continuous-annealing furnace which was built by Electric Furnace Co.

"Aging is due to precipitation of nonmetallic impurities from solid solution . . ."

Another requirement is that the hot-rolled strip should be thick enough to begin with so that the cold reduction to 0.030 in. will exceed a 60 pct reduction. Generally hot bands 0.080 in. thick are most commonly used. Fig. 4 shows a modern cold mill which is especially effective in producing grain-orientated strip.

The heat treated 0.030 in. strip is then cold rolled to 0.012 in. or 0.010 in., though some grain-oriented strip only 0.002 in. thick is now being produced for certain high frequency applications. This 0.002 in. strip is processed from 0.012 in. stock and is exceedingly difficult to produce in the proper orientation. When cold rolled to the thinner gages several intermediate anneals are required. After this final cold rolling the strip is coated with a thin layer of suitable refractory material. The strip is then given the final anneal which will impart (110) [(100)] texture. A special furnace built to continuous anneal silicon ferrite is shown in Fig. 5.

Effects of coating materials

The method of coating and the materials used appear to be very important. In the first place, the final anneal is carried out at extremely high temperatures (2000°F. to 2200°F.), and to prevent the strip from adhering to itself a refractory material is applied to the surface. A great variety of refractory materials like alumina, magnesia, silica, flint, talc, etc., are used. They may be applied singly or severally with a suitable binder. To these other elements are added, as iron oxide (FeO) or the strip is first coated with a thin layer of iron oxide, followed by a layer of alumina. When the strip is at the annealing temperature the iron oxide combines with the carbon which diffuses to the surface of the strip. This method has proven to be quite effective where properly carried out.

A recent patent describes a method of applying a very thin insulative coating which results in a higher space factor. Such tin coatings are extremely important in the production of the extra thin grain-oriented strip (0.002 in. to 0.008 in.) range. In this method the surface is coated with a phosphate layer, 0.2 mills thick, which upon annealing becomes of negligible thickness.

The final anneal is in a mildly oxidizing atmosphere 85 pct N₂ 15 pct H₂ of high dew point. The preferred temperature is 875°F. While the coating is extremely thin, it is said to have excellent insulating properties. Other coatings with various objectives have been developed. In general the purpose of any coating

is to insulate the strip with a thin layer of refractory material. In some instances the refractory layer is so compounded that it will assist in the removal of the non-metallics during the annealing operation.

The magnetic properties of a transformer must remain constant when placed in operation. Unless the grain-oriented transformer iron is carefully processed, aging may occur. This aging is due to precipitation of non-metallic impurities from solid solution. It has been proven by experiment that aging can be eliminated by reducing the impurities well below the limit of solid solubility in the silicon ferrite at room temperature.

Properly processed transformer iron containing less than 0.01 pct C and preferably 0.005 pct C will not age. In addition other impurities such as sulfur, nitrogen and oxygen must also be reduced to safe values. Aging can be induced by holding the steel at 100° C for 200 hr. This usually will cause the hysteresis loss to increase 100 pct. Stabilized or properly prepared transformer iron will not age when subjected to this treatment.

Aging can also be controlled by adding certain elements to the silicon ferrite to change the solubility of the non-metallic elements which cause aging. Manganese reduces the solubility of sulfur; silicon greatly reduces the solubility of carbon. It also facilitates graphitization of the carbide. Aluminum decreases the solubility of nitrogen, about 0.1 pct Al will stabilize the nitrogen.

New, cheaper methods sought

Vast sums of money have already been spent by the producers of grain-oriented silicon strip to find cheaper ways of removing the impurities which cause the transformer core to age. The trend at the present time is to reduce the non-metallics to as low a value, along the lines already discussed, and to add small amounts of metallic elements like manganese which will effectively stabilize the non-metallic impurities.

The (110) [(001)] texture can only be developed in silicon ferrite strip which has been processed according to procedures which favor this texture. Studies at General Electric Co. show how this texture is developed during the final annealing operation and the results are of considerable importance. When the cold-rolled strip which has been properly rolled to the final gage is heat treated below 950°F. no recrystallization takes place, though certain recovery processes do. In the range of 950°F. and 1600°F. recrystallization occurs but the grains are extremely small (0.03 mm diam.). The grains which recrystallize in this temperature range do not have a strong (110) [(001)] texture.

At higher temperatures and with sufficient time, larger grains begin to appear. These new large grains which grow within the matrix of

Turn to Page 186

Form first, sinter later—

Preforming Complex Carbide Shapes

LOWERS COSTS



By F. J. Lennon, Jr.
General Supt.
Kennametal, Inc.
Latrobe, Pa.

♦ GREATER USE of cemented carbide tools and parts by some consumers in the past was due to the difficulty encountered in machining the carbides to the various shapes required. It is not generally known that a complete job of forming can be done prior to sintering and that a wide variety of shapes are being produced in this manner.

Forming and shaping carbide tools can be done economically and quickly before final sintering since the pieces are in a soft, chalk-like state. In many cases costly and time consuming grinding is done on carbide blanks by the user who does not realize that the stock can be removed before final sintering. Failure to recognize this is due perhaps to lack of information regarding the methods involved in powder shaping and its actual possibilities and limitations.

The preparation of the various metallic powders used in the many Kennametal grades are classified as metallurgical operations. After the powder is made forming operations that follow are for the most part mechanical rather than metallurgical. In general there are two ways of making carbide blanks. First, the desired size and shape of piece can be made by feeding the powder into a special die mounted in a tableting press. These "pill" presses, as they are called, are made in various sizes depending on the size of the piece to be pressed, the depth of powder fill, etc.

Powder is fed into a die through a hopper and as the bottom and top ram approach each other the powder is compressed to the proper blank thickness required. The top ram then recedes and the bottom ram raises and ejects the pressed blank. The cycle is comparatively slow and allows time for trapped air to be

Savings can be realized in the design and purchase of carbide tools and parts if users will carefully consider the possibilities of having a more complete job of powder forming done for them. Extra cost involved in the original blank can be saved many times over when it is compared with the cost of having the same stock ground off after it has been sintered. In powder forming operations allowance must be made for shrinkage which takes place in the sintering or hardening heat. In general allowance must provide for a 16.5 pct linear shrinkage or a 40 pct volumetric shrinkage. Unless a piece is unusually shaped, tolerances can be maintained on average-sized blanks to 0.010 in. or one pct of a given dimension, whichever is greater.

forced out of the die before the tip is completely pressed. Most pill presses provide for a core rod working through the bottom ram which makes it possible to press bushings. This is the most efficient way of manufacturing preformed blanks. However, there must be a sufficient number of pieces required to justify the tooling cost involved in making the dies.

When a required piece cannot be made in this manner or the quantity needed is too low to justify the die cost, the prepared powder may be pressed into blocks of various sizes and shapes. These blocks may be round for an order of bushings, square or rectangular for specific blank sizes, or of an irregular shape that approximates the contour of the part required.

A large number of shapes can be formed from these blocks by using general purpose machinery adapted for this purpose. Fig. 1 shows some of the pieces that might be made from pressed powder blocks. Many of these pieces could be pressed directly into shape if the costs involved justified this method. Which method to use depends not only on the number of pieces required in the first order but also on the number of times the order may be repeated and improvement of delivery once the die is available.

Most powder forming is done with grinding

"Removing stock by this method, compared to grinding after sintering, is less difficult . . ."

wheels using a standard silicon carbide wheel, 100 to 120 grit size, and a fairly open structure. The sequence of operations in making up blanks from powder block will vary, depending on the specific pieces involved. Generally, the block will be first cut into the proper size blanks on a special powder saw, shown in Fig. 2, using a 120 grit silicon carbide cutoff wheel. If clearance angles are required, an angle cutter is also used. Here again a 120 grit silicon carbide wheel gives satisfactory performance.

Before sintering, powder pieces are low in strength and require considerable care in handling to prevent chipping or breaking. Stock removed by grinding is formed into a metallic dust which is collected into powder collecting units. This provides protection for the operator and a means of salvaging the excess powder. Each grade is collected in its own unit to prevent mixing of the various grades.

Special shapes or contours are produced on small hand-operated surface grinders, shown in Fig. 3, using shaped silicon carbide wheels. The wheels are dressed by conventional radius dressing attachments. Separate collecting units prevent the silicon carbide grit from mixing with the powders.

No wheel breakdown

Once the wheel is formed to the proper shape, it is a simple matter to shape the powder product to this same contour. The wheel is passed rapidly through the block and the piece is shaped in one pass, see Fig. 4. Little or no grinding pressures are involved and no wheel breakdown takes place. After a long period of time, the grinding wheel grains will dull due to the abrasiveness of the powder and require redressing. In most cases, the quantity made is not sufficient to dull a wheel face. Removing stock by this method as compared to conventional grinding after sintering is considerably less difficult. Once the technique is understood, it will be used more readily to eliminate a great deal of grinding now being performed after sintering.

Tools used for powder forming, such as turning tools, boring bars, drills, reamers, etc., must be diamond tipped to overcome the abrasiveness of the powder. For small quantities of bushings or rounds the powder blocks are turned in conventional lathes, using diamond tipped turning and boring tools. Aside from the care necessary in chucking and clamping the powder block to prevent straining or cracking it in the soft stage, and in the use of



FIG. 1—Typical Kennametal shaped blanks before sintering can be made with general purpose machinery.



FIG. 2—Blocks are cut into blanks on this special powder saw using a 120 grit silicon carbide wheel.



FIG. 3—Surface grinders used in forming contours on special blanks. Powder collecting units are shown.

diamond tipped tools, the procedure is about the same as turning a steel bushing or steel pin on the same equipment. Hole drilling, counterboring, etc., can be quite readily performed on conventional equipment using diamond tipped drills, counterbores, etc.

In all powder forming operations, allowance



FIG. 4—Actual forming operation done on powder surface grinder. The piece is shaped in one pass.

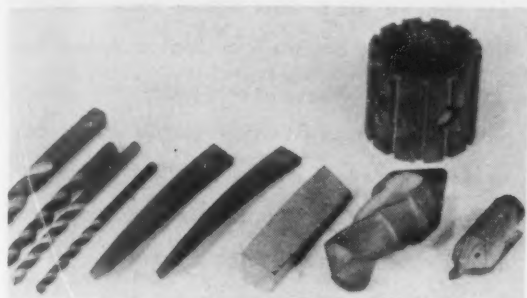


FIG. 5—Group of fluted blanks formed in powder stage. Special machines are designed for this type of work.



FIG. 6—Turbine blade bucket parts are made on an 8-spindle Cincinnati Hy-dra-tel machine equipped with high speed spindles for grinding.

must be made in the piece for shrinkage which takes place in the sintering or hardening heat. This shrinkage factor has several variables. Generally speaking, however, allowance must be made to provide for a 16.5 pct linear shrinkage or a 40 pct volumetric shrinkage. If, for example, a 1 in. cube of carbide is required,

it must be made into a 1.200 in. cube in the powder stage. A sintered bushing of 1-in. diam with a 0.500-in. hole would be made with a 1.200-in. OD and 0.600-in. ID in the powder stage.

Where grinding stock is needed, this also must be considered in making the powder calculations. In calculating dimensions of outside diameters, powder size is equal to the finish size plus grinding stock multiplied by the shrinkage factor. For determining inside diameters, powder size is equal to the finish size minus grinding stock times the shrinkage factor. In the case where a bushing is required with a 0.500-in. ID that calls for a 0.010 in. of stock for finish grinding, the inside diameter of the bushing would be made to 0.500 in. minus 0.010 in. times 1.2 pct to equal 0.588 in. The 0.588 ID in the powder stage will shrink approximately 16.5 pct to provide a sintered bushing with a 0.490-in. ID. These are approximate figures and there are some variables to be considered. Composition, shape and size of piece required are factors that affect shrinkage percentages. A long, rectangular block will not shrink the same percentage in length as it will in width. Different grades shrink at different rates. These variations in shrinkage are small but they must be considered in working to close tolerances in a molded blank.

Large blanks need more tolerance

Normally, tolerances on a molded piece can be maintained readily to 0.010 in. or 1 pct of a given dimension, whichever is the greater. This would indicate that very large blanks require more tolerance than very small blanks.

In many instances where tolerances of this range are permissible, preformed molded blanks are used without finish grinding. Many band grooving tools have been used successfully for shell work without the finish grinding of the form. Blanks used in shaping and forming wooden parts also are used successfully without final form grinding. Trepanning tools are being used very successfully with the form unground. The only reason for grinding such form tools would be to obtain greater accuracy on the form than can be held in the molded state.

As the need for more intricate forming work increases the need for more complex equipment arises. However, this is no different than the situation that exists in steel fabrication. Regardless of what the complexities are in powder shaping, it is better to give consideration to the stock removal in the powder stage than to be faced with the same problem of stock removal after sintering. Fig. 5 shows a group of fluted tools which have been formed in the powder stage on special machines designed for this particular type of work. Large and complex machinery such as the 8-spindle Hydro-tel grinder, Fig. 6, is needed to manufacture turbine bucket blades.

Modern Plating Equipment Is Designed For All Types of Shops

—Generators, Rectifiers, Busbars and Control Equipment—

Third of a series

By John E. Hyler

John E. Hyler & Associates
Peoria, Ill.

♦ A LOW-VOLTAGE, dc power supply is required for electroplating operations. Either a motor-generator set or a rectifier is commonly used for this purpose. There is much difference of opinion as to which equipment gives better service. Even among those who favor one or the other, opinion varies as to a particular type. The functions of motor-generator sets and rectifiers are similar to the extent that both convert ac to low-voltage dc, but by entirely different principles. Actually, both types of equipment perform very satisfactorily.

Generators weigh and cost more than rectifiers of equivalent capacity. They require separate controls and greater floor area, and are less readily portable. Their more rugged construction makes them less subject to failure from excessive overloads and high operating temperatures. They withstand greater abuse and performance is affected to a lesser degree by the corrosive agents in a plating shop atmosphere. Corrosion-resistant coatings have been developed which provide a high degree of protection to rectifier plate without loss of efficiency.

The type of generator usually used for electroplating is part of a self-contained unit which includes an ac motor to drive the generator. Power for the motor is supplied from a standard 110, 220 or 440-v ac source. Selection of a motor-generator set is made on the basis of its characteristics for a particular type of work. They are available for virtually any plating operation. One firm builds them in sizes ranging from 300 to 50,000 amp and in a variety of ratings from 6 to 50 v.

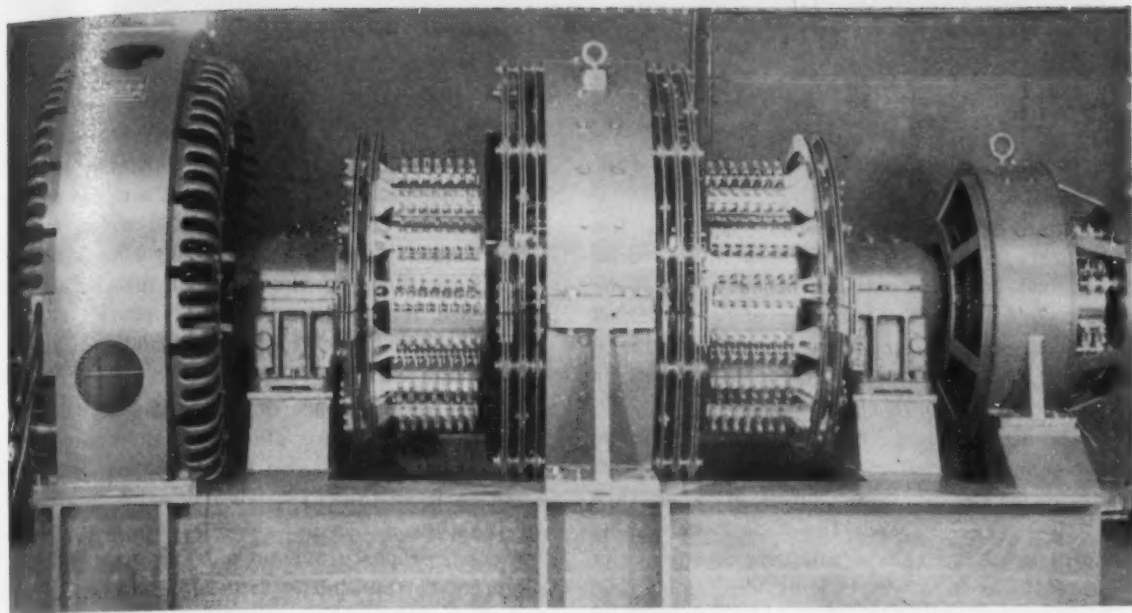
The efficiency of a motor-generator set is higher than that of a rectifier when operated at peak load. Its efficiency is greatly reduced when operated at a very small load. At a 25 pct load, more than 30 pct of its efficiency is lost.

Both generators and rectifiers perform efficiently in supplying the low-voltage dc power required for plating. Opinions vary regarding a choice between the two types of equipment. Generators cost more, are heavier per unit of power and require more floor space than rectifiers. Their rugged construction makes failure less likely from excessive overloading and incompetent handling. Power is usually transmitted to tanks through copper busbars. Aluminum busbars are also used but their cross-sectional area should be about 50 pct greater. Devices have been designed to accurately time and control each phase of a complete plating cycle.

Some motor-generator sets have separate exciters which are part of and directly connected to the set. Since the driving motor is part of the set and has been specifically designed for the work load, no calculations are necessary regarding the size required. In cases where the motor and generator are separate units, the horsepower rating for the motor required can be easily calculated.

A generator with a capacity of 5000 amp at 6 v has a power output of 30,000 w. Assuming the operating efficiency to be 80 pct at peak load, the motor must be of adequate size to make up this loss in efficiency. Therefore, the theoretical power output of 30,000 w is increased by 25 pct. The power to be delivered by the motor is 37,500 w. A 50-hp motor will therefore be required. If it can be foreseen that additional loading will be imposed, the horsepower rating of the motor should be increased accordingly.

The generator voltage requirement will depend upon the type of work to be done. Although most electroplating operations require a 6-v generator, the sulfuric acid system of aluminum anodizing generally requires 18 or 25 v and a chromic acid electrolyte requires a 40 or 50-v



GENERATOR designed for use with high-speed automatic plating equipment. Its rating is 12,500 amp at 9 v. It

is driven by 80 pct leading power factor synchronous motor. Courtesy Hanson-Van Winkle-Munning Co.

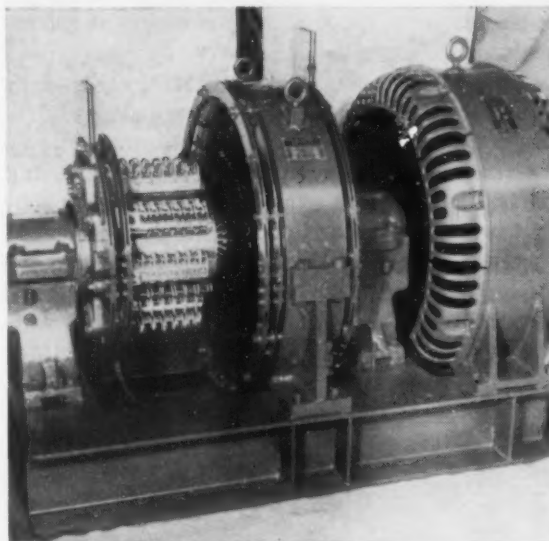
generator. Small generators are often self-excited. Shunt-wound generators frequently used in large layouts have separate exciters. Squirrel-cage induction motors are also widely used for driving small generators while synchronous motors are favored for driving larger generators.

Before selecting a motor-generator set, a manufacturer with wide experience in this field should be consulted. Generating equipment demands due consideration to elimination of all resistance losses. Insulation should resist the highly-corrosive atmospheres encountered.

Rectifiers convert ac to low-voltage dc by an entirely different principle than that used in a motor-generator set. A rectifier allows current to flow in one direction but prevents it from flowing in the reverse direction. When ac is applied to a single rectifier, one half of each cycle is blocked off resulting in pulses of current flowing in the same direction. This is known as half-wave rectification.

The circuits in a rectifier for electroplating are designed so that rectification takes place in both halves of a cycle. This is known as full-wave rectification. Application of this principle overcomes many unsatisfactory aspects of half-wave rectification for plating purposes. Even with full-wave rectification, considerable ripple is present when power is supplied from a single-phase ac source. By using a three-phase ac source, ripple is greatly reduced and the more uniform flow of current is as satisfactory for plating as that delivered by a motor-generator set.

Some single-phase 6-v rectifiers are sold for low-amperage service. They are usually rated for 1000 w or lower and are intended primarily



SINGLE-COMMUTATOR generator delivers 3000 amp at 15 v. It is driven by a low-speed synchronous motor and is separately-excited from a 125-v source. Busbars are easily connected to terminals at the top. This unit is specially designed for electrocleaning. Courtesy Hanson-Van Winkle-Munning Co.

for use in laboratories and very small installations. Three-phase rectifiers are designed for a much wider range of application. One firm makes them in sizes from 300 to 4000 amp. Most of these are equipped with controls and meters, and when desired, can be provided with remote control.

Self-contained rectifier units are made in sizes ranging from 150 to 6000 amp. A unit of this type includes a stepdown transformer, rectifier stacks, cooling fan, electromagnetic starter and pushbutton station, protective overload circuits,

Rectifiers are adaptable to many special applications . . . Good busbar installations cut current losses . . .

output meters and shunt, and a continuous full-range output control.

Rectifiers differ as to the material used for the rectifying plates. Many use selenium while others use copper oxide or magnesium-copper sulfide. One type of selenium rectifier contains about 6000 sq in. of rectifying area and is simple to install and operate. It is frequently used for service requiring high current densities.

Electroplaters and rectifier manufacturers have coupled their efforts to develop rectifiers of a highly competent type. These rectifiers are controlled remotely from the tank area. Some manufacturers provide a complete line of selenium rectifiers for electroplating, electrocleaning and electropolishing in stock models from 5 to 10,000 amp and from 1 to 60 v.

One rectifier, known as the Rectoplater, is of the magnesium-copper sulfide type. It incorporates asymmetrical conductive couples arranged to convert ac to dc. Rectification occurs at the interface of dissimilar plates. When the copper sulfide plate carries a positive charge, current flows readily and with little voltage drop. When the plate is charged negatively, no current flows. Rectification is accomplished without moving parts, liquids, spark gaps or other materials subject to wear or requiring periodic replacement.

Many variations can be incorporated into the design of rectifiers to adapt them for special applications. Some are equipped with dual voltage controls with which a 6-v, 4000-amp rectifier

can be reconnected for 12-v, 2000-amp service. When necessary, any number of similar rectifiers can be connected in parallel which means that capacity can be increased by simply adding more rectifiers to the original installation. In one case, ten 6000-amp rectifiers provide an output of 60,000 amp for hard chrome plating of naval gun barrels.

Some rectifiers are made for use near plating tanks. The selenium stacks are immersed in oil and hermetically sealed to provide complete protection from the corrosive atmosphere.

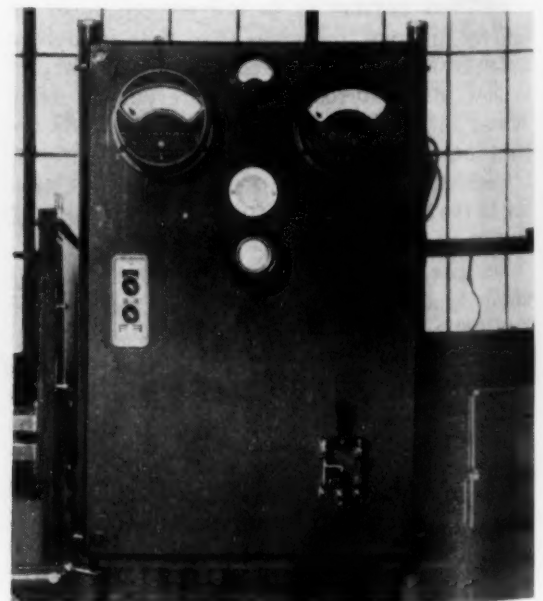
Whether a rectifier or a motor-generator set is used, proper provision must be made to carry current to the plating tank. Busbars are almost always used for this purpose. Resistance in the busbar system is due to some extent on the distance between the power source and the tank. Therefore, the source of power should always be located as close as possible to the plating tank.

Current for electroplating is usually in excess of 100 amp. Conductors used should be of adequate size to carry the current involved without appreciable current loss. Current loss cannot be afforded in view of the small electromotive force normally used. Copper is generally used for busbars. Aluminum busbars are also used but their resistance is about 50 pct greater than that of copper and their cross-sectional size must be proportionately greater.

Use of good busbar clamps insures proper contact without any need for drilling holes through



RECTIFIER with 1500-amp, 9-v output has control unit for remote operation from any point in plant. Units such as this are used singly or in multiple depending on needs. Courtesy Hanson-Van Winkle-Munning Co.



STANDARD CONTROL PANEL for electroplating generator. This unit includes a dc ammeter with a separate shunt, a dc voltmeter, start-stop pushbutton station and field switch. Courtesy Hanson-Van Winkle-Munning Co

the bars. It is very important that good tight contacts be obtained at busbar joints and at the anode and cathode hooks.

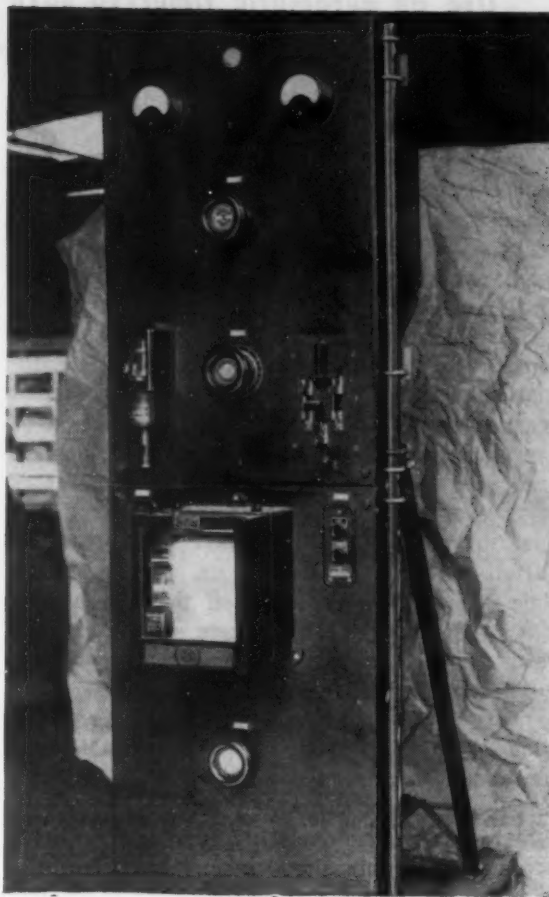
Busbars mounted along the edges of tanks should be properly insulated. The insulating material should not be moisture-absorbent, otherwise it will become a conductor resulting in loss of current. Wood strips or blocks heavily coated or impregnated with wax are often employed to support the busbars. Blocks of Bakelite are also used in some cases. Insulated joints should be used for pipes in plating tanks to prevent loss of current.

Controls are automatic . . . They may be electrical, electronic or electro-mechanical . . .

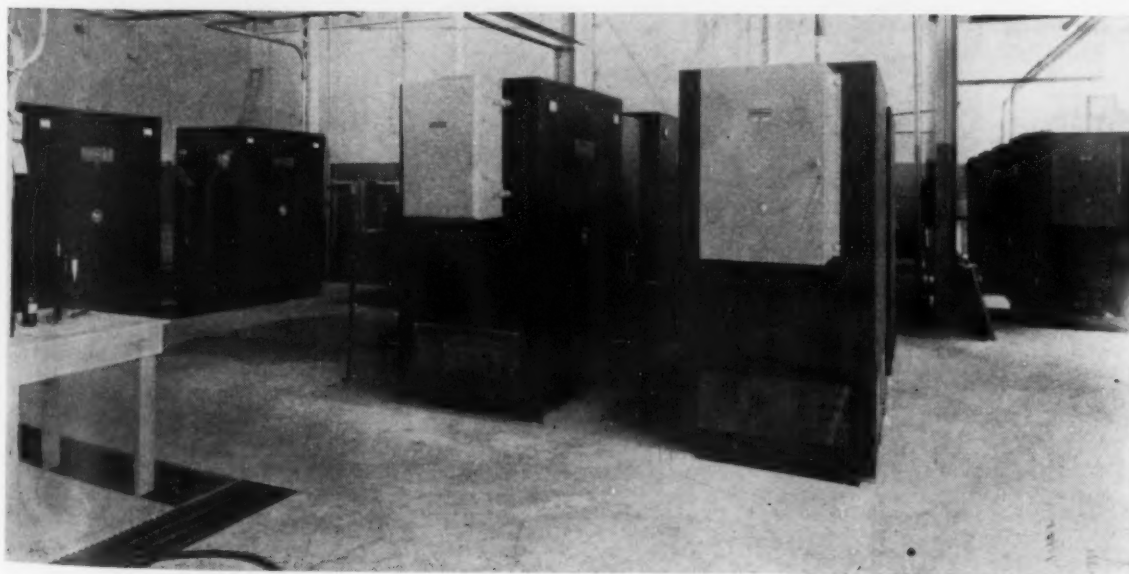
Remote control units to start, stop, meter or regulate output of a rectifier can be installed at any point in the plant. Synchronous-motor timers are also used to automatically time any electrofinishing operation. Such timers operate for any preset time interval. A special reset circuit is provided to periodically repeat the timing cycle. A number of synchronous timers with suitable interlocking circuits can control any sequence of finishing operations automatically.

Another possibility is the use of voltage and current stabilizers on certain setups. Output voltage of a rectifier, like that of any power source, tends to vary as load current rises or falls, or as input voltage fluctuates.

A typical application of such automatic controls is found in the anodizing process where voltage starts low and gradually builds up as the



AUTOMATIC CONTROL PANEL for aluminum anodizing. The standard controls found in a generator control panel are included in this panel. In addition, it contains an overload relay, time cycle voltage control with a magnetic field contactor, start-stop pushbuttons for anodizing control and a discharge resistor. Courtesy Hanson-Van Winkle-Munning Co.



HUGE RECTIFIERS in this installation supply power for hard chrome plating of naval gun barrels. It involves the use of ten selenium rectifiers with a total output of 60,000 amp. The use of saturable reactor controls per-

mits smooth variation in power delivery. Range of output extends from full load to 10 pct of the rated load for each rectifier. More rectifiers can be added when needed. Courtesy Rapid Electric Co.

Use an automatic timer to save money . . . It shuts off currents, avoids overplating . . .

oxide coating forms on the work. With such controls, attention and supervision can be greatly reduced. Where its use is indicated, the equipment pays for itself quickly by reducing costs and greatly improving quality.

Some barrel-plating layouts incorporate an automatic timer for the plating current. It automatically shuts off current when the deposit reaches proper thickness. Thus, elimination of overplating saves expensive metal. The element of human error is also eliminated and operators may devote their attention to other work. The operator simply sets the timer and presses a button to turn the current on. When plating time is up, the timer shuts off the current and signals the operator. A toggle switch may be used to turn the signal off when it is not desired.

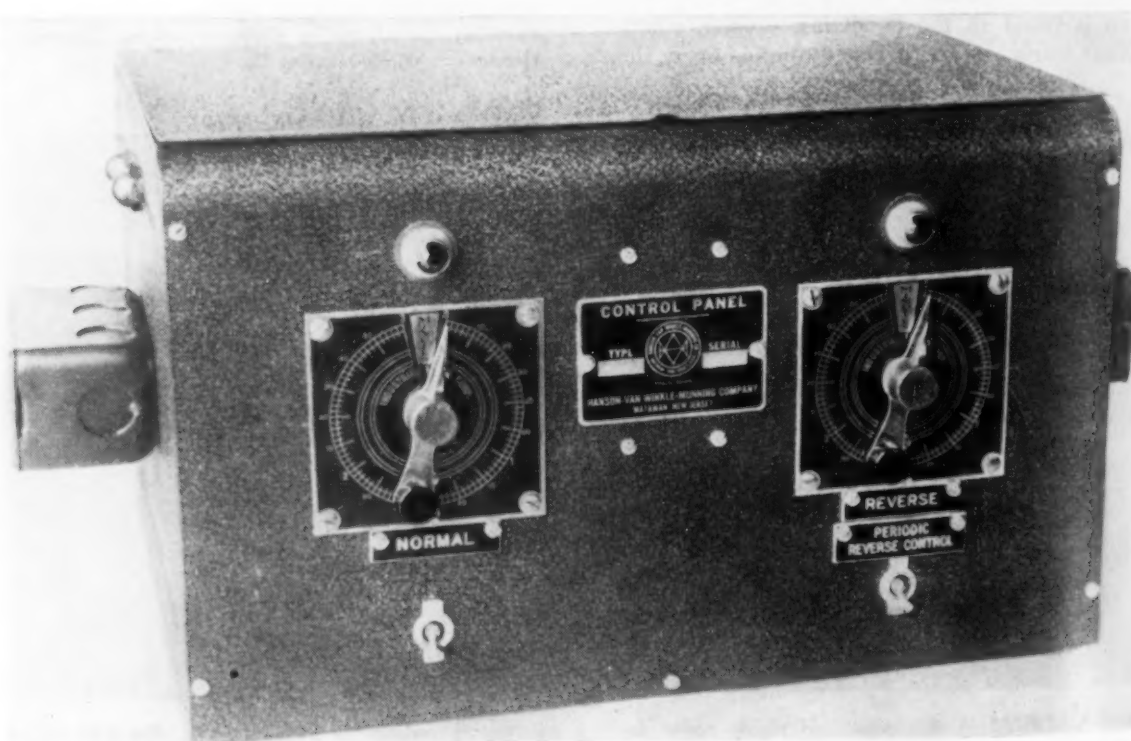
There is also a non-deplating current provided by this device to protect the work. When the timer shuts off the main current, a special resistance coil maintains a small flow of current through the tank to prevent deplating. A knife switch cuts off non-deplating current when it is not needed. Lights signal when plating current is on or off, and when the non-deplate current is on. The timer continuously indicates the remaining time required to complete the plating period.

Some standard plating equipment has been adapted for use in highly specialized operations. For example, generator voltage can be reduced without interrupting the electrolytic operation in event of an overload. Arrangements may also be made to sound an alarm if the generator is overloaded. Measurement of the deposited thickness by amp-hr recording is a possibility. It is also possible to record voltage, current or temperature of solution. Various other specialized installations and functions can be arranged.

Many installations where more than one kind of work is done require different tank voltages. In such instances, power supply equipment is set up to deliver the highest voltage. Rheostats are then used on each tank requiring a lower voltage.

Tank rheostats furnish the desired current density for plating by introducing a voltage drop between the main lines and the tank rods. This produces the required voltage between the anode and cathode. A number of switches are usually connected to different resistors to give different rated voltage drops at the current loads marked on the switches. The number and rating of switches should provide the maximum number of control steps. A large master switch in the center of some tank rheostats cuts off current to the tank and eliminates the operation of several switches each time the tank is unloaded.

A short-circuiting switch for striking nickel or chromium on die castings can be provided by simply adding a set of jaws to the master switch of the tank rheostat. With the switch blade in



CONTROLLER for automatically reversing the direction of current in PR plating. Timers are set for normal and

reverse flow current. Controller improves process efficiency. Courtesy Hanson-Van Winkle-Munning Co.

the upper set of jaws, the rheostat is short-circuited. With the switch blade in the lower jaws, the resistances in the circuit are according to settings of the small switches. Under short-circuit conditions, the ammeter is automatically disconnected to prevent damage by heavy current.

Some switches are of the self-cleaning cam type which provide easy and positive current control at all times. It insures perfect contact with the busbar when the switch is in closed position. Adequate current-carrying capacity is assured through ample contact surface and cross-sectional area. These switches incorporate leaves which are actually multiple cleaning units. When the switch is closed, these leaves exert a wiping action on the surface of the busbar and keep contact surfaces clean at all times.

Control panels are available for both semi-automatic and full-automatic electroplating installations. They are designed to handle virtually every operation without any manual regulation. Programming of generator voltage from zero to the voltage required for anodic treatment of various metals can be arranged. A specific uniform voltage may be maintained under all load conditions when desired. Current flow can also be interrupted at specific intervals.

Interruption of dc for short intervals without any reversal is believed by some that smoother or brighter plating deposits may be obtained. This may be true in some cases where interruption intervals are short. Long interruption intervals can be highly deleterious. In nickel plating a long interruption may result in a lamination in the deposit.

One way to avoid the harmful effects of long interruptions is to equip the tank with an auxiliary current source such as storage batteries. These can be protected from overcharging by a

set of rectifier disks. Storage batteries will automatically supply a small current if the motor-generator set breaks down.

A plating technique which has gained attention is the use of periodically-reversed current, referred to as PR plating. Direction of plating current is reversed at regular intervals to make the work alternately cathodic and anodic. During the normal part of each PR cycle when the work is cathodic, metal is deposited in the usual manner. When the current is reversed and the work becomes anodic, metal is removed from the work.

The advantage of PR plating is the rapid removal of metal from regions of the deposit which are porous, adhere imperfectly and are higher than surrounding areas. Areas well plated tend to remain unaffected. As a result, each new deposit is made over a sound deposit. Irregularities and roughness are eliminated after a number of PR cycles.

PR plating does not add appreciably to plating time because the current densities used are two to four times greater than normal. Sometimes it requires less time. Moreover, PR plating aids in overcoming certain difficulties such as nodules around burrs, buildup around corners, porosity, roughness, thin deposits at the center of the work, irregular anode corrosion and passivity or blackening of copper anodes in cyanide plating.

The process has made it possible to deposit thin coats with unusual uniformity and high corrosion resistance. The brighter, smoother deposits require little or no polishing or buffing. Heavy deposits can be made on irregular shapes. Satisfactory results have also been obtained with substitute materials for the scarcer, restricted and more expensive plating metals. Some manufacturers of selenium rectifiers have designed controls for PR plating so that the process can be applied efficiently and at minimum expense.

NEW BOOKS

"Control of Electric Motors," by Paisley B. Harwood. Development of controlling devices has paced the rapidly widening use of electric motors in industry. Arranged by motor types, the book describes the design, construction and application of controllers. It begins with a general discussion of wiring diagrams, construction details, and pilot devices. Both ac and dc motors are covered. John Wiley & Sons, Inc., 440 Fourth Ave., New York 16. \$7.50.

"Textbook of Engineering Materials," by Melvin Nord. For first year engineering students, the author offers a coherent presentation of fundamental data on engineering materials, their production and their application. The range of material is so broad as to preclude an all-inclusive presentation for each subject. Appli-

cation of simple concepts in science to engineering, and the effects of economic factors on engineering practices are demonstrated. John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y. \$6.50. 518 p.

"Automation, The Advent of the Automatic Factory," by John Diebold. A new economic and social era is being opened by the automation in industry. This is the first popular account of the possibilities and limitations of electronically guided machines which correct their own errors and carry on repetitive tasks with skill and precision. Business, labor, government, science have a vital interest in the future development and growth of automated production. D. Van Nostrand Co., Inc., 250 Fourth Ave., New York 3. \$3.00. 181 p.

DUCTILE IRON:

Watch Copper Buildup



By J. C. Neemes

Twin Cities Field Technical Section
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Minneapolis

Small amounts of copper increase strength and hardness and reduce ductility of ductile iron in the as-cast condition. It's a disadvantage in castings which must meet minimum elongation or optimum machining requirements. But it helps where strength and wear resistance are needed. Annealing corrects deficiencies in ductility, but annealing times must be longer than for copper-free ductile iron. Shops interested in meeting ductility requirements without annealing should guard against copper buildup from use of copper-containing magnesium additions and revert scrap.

♦ **MAGNESIUM ADDED TO CAST IRON** produces graphite in spheroidal form. Since this has been known, there has been a great deal of experimental work on addition agents. Most of the alloys investigated have been nickel-magnesium and nickel-silicon-magnesium compositions, or similar combinations in which part or all of the nickel has been replaced by copper. Since the start of the Korean War, particular attention has been devoted to the copper-containing addition agents because of the necessity for conserving nickel, and therefore the resultant effects of copper as an alloying element in ductile iron have warranted considerable attention.

Copper in flake-graphite cast iron exerts only a mild strengthening effect when present in quantities below about 0.75 pct. Larger amounts are not dissolved in ferrite and remain in the matrix as microscopic globules of elementary copper. Greater quantities than 0.75 pct may be taken into solution in ferrite when nickel is present.

This background of information gave little in-

dication that small amounts of copper would have any significant alloying effect in ductile iron. Nor did laboratory investigations of experimental heats contribute information to the contrary.

Commercial production, however, has yielded experience of a somewhat different nature. The foundryman uses daily a certain portion of revert scrap in his production. Since copper is relatively non-oxidizing, it remains in the scrap and, by being reintroduced in the furnace charge, builds up to a level considerably above what might be expected simply from addition of a copper-containing magnesium addition agent.

This point is illustrated in the accompanying graph. The left-hand portion of the diagram shows the result of making a 2 pct ladle addition of a magnesium carrier to gray iron over a period of days, when the melting charge incorporates 30, 40 or 50 pct revert scrap. When the carrier contains 5 pct copper and the foundry employs 30 pct revert scrap daily, residual copper content of finished castings builds up to a level of 0.14 pct in 3 days and stays there.

When, however, a magnesium carrier containing 15 pct copper is employed and 50 pct return scrap is used, build-up of copper takes 7 days before leveling out at about 0.60 pct. Likewise, the right-hand portion of the chart shows that when a 2½ pct ladle addition is employed under the same circumstances, 15 pct Cu and 50 pct returns, copper content reaches 0.75 pct in 7 days and has not quite attained its peak.

Residual copper contents of these levels are far from the negligible amounts normally expected from simple ladle additions of a magnesium-copper addition agent, and are considerably above the levels encountered in laboratory investigations, where revert scrap is rarely used.

Copper build-up passed unnoticed when foundries first began to shift from nickel-containing magnesium carriers to those containing copper, probably because the transition was generally gradual rather than abrupt. Presently, however, complaints regarding machinability of as-cast ductile iron were received from a few scattered sources. Annealing response of such castings to conventional treatment seemed to be poor. There was nothing consistent about these difficulties, and copper itself was not suspect until enough data on many successive heats were collected to permit appraisal on a statistical basis. This showed a gradual and rather consistent trend toward higher hardness and strength in the as-cast condition, coupled with lower elongation.

As an example, there have been collected in Table I data on a series of foundry heats pro

TABLE I

AS-CAST PROPERTIES Copper-Containing Heats, 1952

Analysis						Tensile Strength	Elongation, Pct	Bhn	K Factor*
C	Si	Mn	P	Ni	Cu				
3.90	2.40	.30	.037	1.12	.25	109,200	3.5	289	406
3.65	2.55	.38	.038	1.03	.36	104,000	2.5	269	386
3.88	2.58	.39	.056	.92	.37	102,700	2.5	255	403
3.75	2.54	.38	.052	1.18	.40	110,300	3.0	289	410
3.54	2.43	.34	.044	1.11	.40	111,000	3.5	269	413
3.78	2.43	.37	.047	1.18	.43	101,800	2.5	269	377
3.65	2.55	.38	.038	1.03	.46	109,700	3.5	262	418
3.84	2.55	.37	.037	1.19	.46	108,300	3.0	269	402
3.82	2.17	.31	.038	1.21	.48	115,400	4.0	269	429
3.82	2.23	.33	.045	1.14	.48	105,800	3.0	255	414
3.54	2.43	.34	.044	1.11	.52	110,600	4.0	255	433
3.82	2.37	.36	.036	1.18	.52	110,400	4.0	262	410
3.86	2.31	.36	.033	1.18	.58	116,400	5.0	262	433
3.54	2.43	.34	.044	1.11	.64	112,000	4.0	255	439

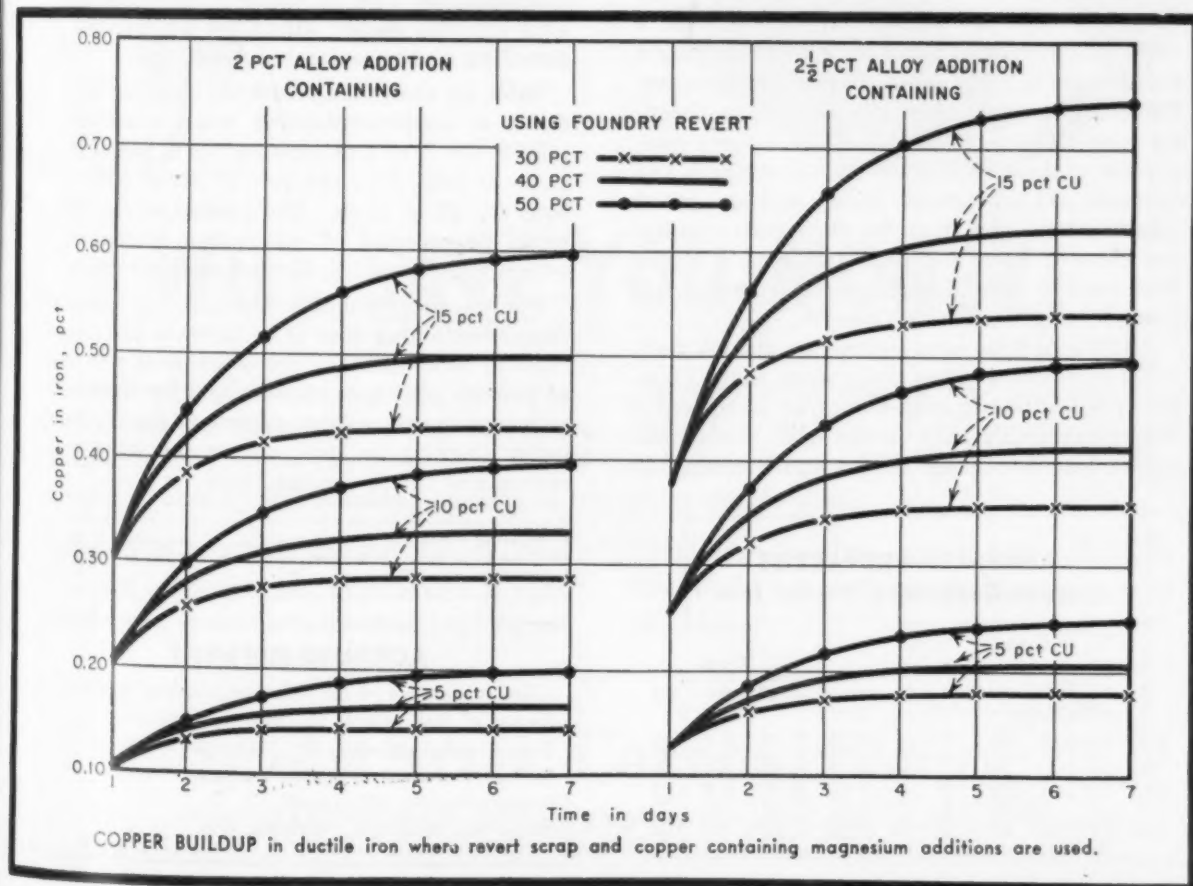
* Tensile strength divided by Brinell hardness number.

TABLE II

AS-CAST PROPERTIES Copper-Free Heats, 1950

Analysis						Tensile Strength	Elongation, Pct	Bhn	K Factor†
C	Si	Mn	P	Fe	Cu*				
3.71	2.52	.34	.046	1.18	...	103,400	5.5	229	451
3.62	2.80	.34	.036	1.17	...	98,700	8.0	217	431
3.70	3.09	.34	.054	1.21	...	93,700	9.0	229	409
3.65	2.79	.40	.050	1.18	...	103,200	7.0	229	450
3.74	2.68	.38	.046	1.19	...	93,000	5.0	217	428
3.73	2.74	.42	.050	1.14	...	102,200	8.5	241	450
3.64	2.68	.41	.049	1.10	...	101,025	6.2	217	465
3.51	2.50	.29	.079	...	...	94,350	7.5	207	455
3.51	2.53	.33	.072	...	...	109,800	6.5	229	490
3.67	2.05	.38	.074	1.38	...	109,600	5.0	241	455
3.73	1.90	.20	.047	1.44	...	109,600	5.0	241	455

* Not determined but estimated 0.05 maximum as incidental.
† Tensile strength divided by Brinell hardness number.



COPPER BUILDUP in ductile iron where revert scrap and copper containing magnesium additions are used.

"Small amounts of copper improve the strength of ductile iron in the as-cast condition, raise hardness, reduce elongation . . ."

duced in 1952 from one shop using a copper-containing magnesium carrier. The results were obtained on as-cast 1 in. keel blocks and are arranged in order of increasing copper content. In other respects compositions are not significantly different. Residual magnesium content ranged from 0.05 to 0.07 pct, and sulfur from 0.010 to 0.018 pct. Compact spheroidal graphite, as distinguished from quasi-flakes or the lacy nodules of malleable iron, was consistently achieved. All heats had been inoculated with ferro-silicon upon reladling after the magnesium treatment, a practice known to encourage maximum ductility in the as-cast condition.

Tensile strength is consistently above 100,000 psi, elongation ranging from 2.5 to 5 pct and Brinell hardness from 255 to 269. There is little, if any, consistent trend with increasing copper content. The K factor, obtained by dividing tensile strength by Brinell hardness number, varies from 377 to 439. This K factor establishes the relationship between strength and hardness. A low value indicates the strength is somewhat lower than would be expected from the hardness and is generally caused by the presence of primary carbides.

Your shop needs important

The data of Table I take on meaning when compared with the figures in Table II for a series of commercial heats made in 1950 using a magnesium addition agent containing no copper. These data were selected to provide base chemical compositions and production techniques comparable to those of Table I. Tensile strength and hardness are consistently lower, and elongation significantly higher than for the copper-containing irons of Table I. The K factor, at a higher level than in Table I, indicates that hardness is lower for a given tensile strength.

Additional data were secured by making tests on 22 consecutive ladles in the shop, using a copper-free additive in even-numbered ladles and a copper-containing alloy in the odd. Since some copper was introduced in the return scrap, the

comparison amounted to a check of two irons containing 0.12 pct and 0.25 pct copper respectively. The base composition was 3.60 pct C, 2.40 pct Si, 0.43 pct Mn, 0.070 pct P, 0.015 pct S, and 1.15 pct Ni. Tests of as-cast 1 in. keel blocks indicated that material of lower copper content had a Brinell hardness 12 to 15 points lower, and elongation 2 pct higher. The average K value on the eleven sets of test bars was 425 for iron containing 0.12 pct Cu and 400 for iron containing 0.25 pct Cu.

The data indicate that small amounts of copper improve the strength of ductile iron in the as-cast condition, raise hardness and reduce elongation. Depending on the viewpoint this may be either a curse or a blessing. To shops interested in meeting a minimum elongation requirement of 5 pct in the as-cast condition, which is common, or in supplying castings with optimum machining characteristics, the presence of copper is undesirable. On the other hand, for some applications ductility is of secondary or no importance, and the increased strength and wear resistance is worth the sacrifice to machinability. In these instances a small amount of copper gives a large return in improved properties.

The effect of copper can be eliminated by annealing. Annealing temperatures are not affected by copper, but time at temperature is increased. This explains earlier difficulties experienced in annealing copper-containing ductile iron.

Table III shows the properties obtained with a series of copper-containing irons annealed at 1650°F for 3 hr and slow cooled in sealed furnaces to 1000°F at the rate of about 50°F per hour for 10 to 12 hr. The properties are what would be expected of copper-free ductile irons with a fully annealed, ferritic microstructure.

One means of reducing the annealing time of copper-containing iron is to increase the silicon content, although this procedure does not tend to produce high toughness.* Another limitation to increasing the silicon content is the fact that heavy slagging or kish can develop when both carbon and silicon are very high.

**TABLE III
ANNEALED PROPERTIES
Copper-Containing Ductile Iron**

Analysis						Tensile Strength	Yield Strength	Elongation, Pct	Bhn
C	Si	Mn	P	Ni	Cu				
3.66	2.60	.29	.041	1.21	.36	88,700	53,100	20.0	159
3.73	2.56	.31	.040	1.06	.41	89,500	57,800	19.0	167
3.74	2.84	.32	.040	1.11	.40	73,600	58,000	18.0	170
3.26	2.89	.36	.068	1.34	.24	70,100	55,000	21.0	163
3.24	2.58	.33	.064	1.31	.26	68,800	54,000	22.0	158
3.25	2.62	.35	.074	1.04	.37	75,600	59,200	18.5	180
3.90	3.20	.37	.074	1.05	.39	74,200	55,800	15.0	168

* "Effect of Chemistry and Section Size on Properties of Ductile Iron" by D. J. Reese, F. B. Rowe and G. A. Conger, SAE Quarterly Transactions, July 1952

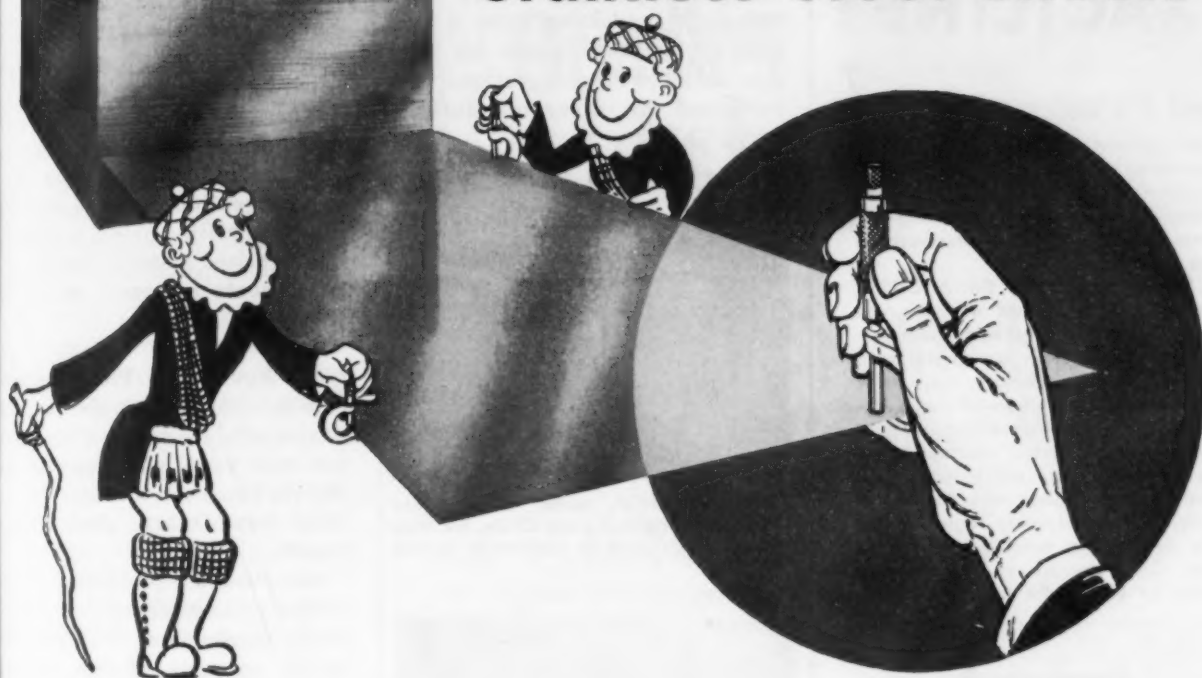
ACKNOWLEDGMENT

The cooperation of the following foundries in offering the use of their records and help is appreciated:

State Foundry & Machine Co., Cedar Grove, Wis.
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Prospect Foundry, Minneapolis
Valley Iron Works Co., Appleton, Wis.

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February 5, 1953

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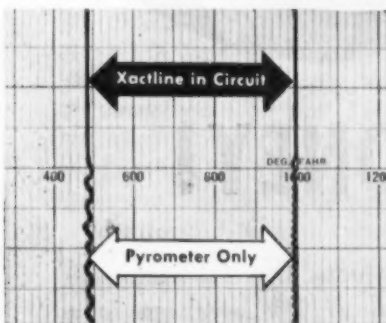
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Exact reproduction of temperature chart for a heating process showing the comparison of the "Straight-Line" temperature control produced by XACTLINE and the saw-tooth curve obtained with only conventional control.

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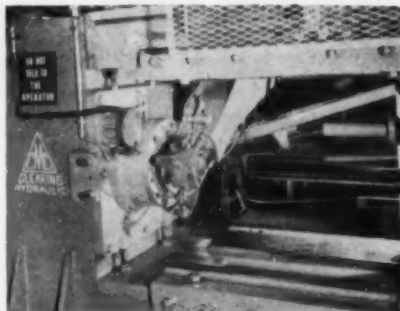
Engineering

DRAWING:

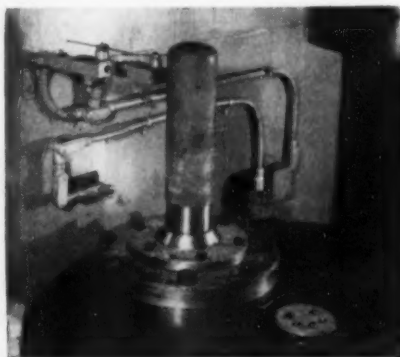
Conveyers, integrated presses help boost shell output.

Faster and better production of 90 mm cartridge cases at Rheem Mfg. Co.'s New Orleans plant has been possible through wider use of materials handling techniques and integration of presses with work flow lines.

To meet Rheem's need for faster and better presses to keep pace with high production lines, a new kind of hydraulic press for cupping and drawing operations was developed by Clearing Machine Corp., Chicago.



FEEDING DEVICE, center, is built into Clearing Double End press. Chute, fed from behind, aligns parts in position to receive punch.



LIMIT SWITCHES make certain cases are properly positioned on heading post. If case hits top finger switch, press will not stroke.

Lost Motion Out—A press drawing a shell to a final length of 24 in. requires an unusually long stroke. The long return stroke necessarily slows down the total stroke time. A way of reducing this lost time, Clearing reasoned, is to produce at both ends of the stroke, eliminating lost motion from operating time. The Double

IF YOU WANT MORE DATA

You may secure additional information on any item briefed in this section by using the reply card on page 123. Just indicate the subject heading and the page on which it appears. Be sure to note exactly the information wanted.

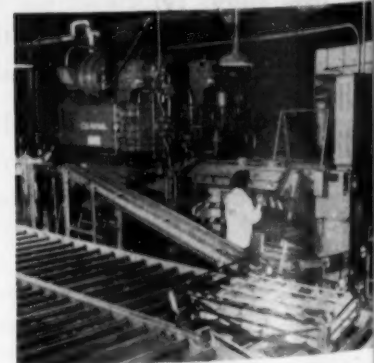
End press does just this and has a number of other advantages which fitted in with Rheem's plans.

These presses have a lower original investment and require less manufacturing space than two conventional presses, especially where ceiling height is a factor. ConveyORIZED material handling arrangements are easily adapted to them.

No Foundation Pits—Installation is relatively simple. No foundation pits are required. This matter was especially important to Rheem since sub soil conditions at their New Orleans plant are unstable.

Maintenance problems are simplified by easy access of the operating mechanism. Only half the motor capacity of two separate presses is required.

In-Process Gaging—Finished cartridge cases, in order to pass ordnance inspection, must be highly accurate in concentricity and dimension. The drawn parts pass frequent in-process gaging.



CONVEYERS and automatic handling devices play an important part integrating high speed production units.

MODELS:

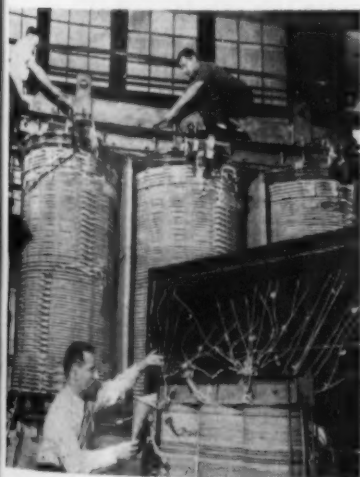
Electrical characteristics of big transformers predicted.

A new and successful method of determining transient voltages in transformers by using electromagnetic models has been developed by the General Electric Co.'s Power Transformer Dept., Pittsfield, Mass.

Tells All—Answers on voltage magnitudes and wave shapes, vital information to transformer designers, are supplied accurately and simply by testing a model before the transformer itself is designed. Designers will be able to plan construction of transformers with more efficient use of insulation and consequently more exacting use of materials and space.

Faithful—The electromagnetic model reproduces the voltage magnitudes and wave shapes between any two points in a transformer, for applied waves of all types, and for all transformer connections.

Its applications include: improvement of transformer designs; development of radically new winding structures; failure detection; and prediction of how a transformer behaves as a part of the power system.



BIG 3-PHASE TRANSFORMER rated at 33,333 kva, is shown beside model 1/6th the size and 1/216th the weight. Inventor P. A. Abetti says the model determines transient voltages, will permit better use of materials in building big transformers.

Turn Page

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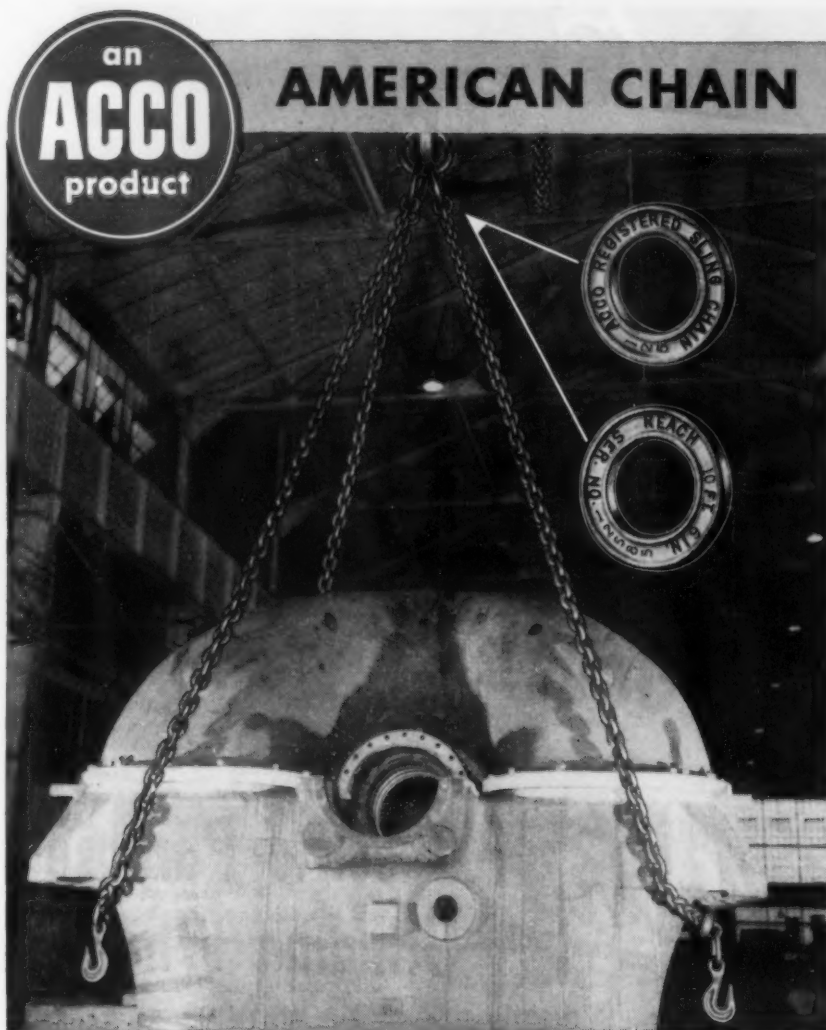
May we, without cost or obligation, send a technical expert to learn at job-side exactly what your individual requirements and working conditions are? Write, wire or phone.



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Technical Briefs

BIG FAN:

Exhaust fan driven by 350-hp motor cleans nickel mine air.

A 20-ton exhaust fan, shaped like a huge malted milk container, has been installed by The International Nickel Co. of Canada, Ltd., to ventilate underground workings of the new caving project at its Creighton Mine, Ontario.

The giant vertical fan, driven by a 350-hp motor weighing 5 tons, ventilates the workings by a flow of fresh air at the rate of 300,000 cfm.

From Surface—The fan draws the air down from the surface, directly through the caved or broken ore, circulates it through the underground workings and carries it back to the surface through a main return shaft. It is at the top of this shaft that the fan is mounted.

The fan stands 42 ft above its concrete base. Diameter at the inlet is 15 ft. The 124-in. impeller has 12 stainless steel blades which are adjustable in pitch through 25° to accommodate the load as the mining operation moves farther from the main shaft.

Caving—In the caving method of mining at Inco's properties in the Sudbury area, gigantic masses of undercut ore, far underground, are induced to cave and disintegrate through tension and torsion as well as of their own weight. This low-cost bulk mining method, plus metallurgical practices, make it practicable to recover and treat ore lower in grade than it has ever worked in underground mining.



REACTOR CONTROL provides constant cutting speed on a turret lathe. A probe moves an armature which changes the reluctance of the reactor magnetic circuit.

METHODS ENGINEERING:

Small shop benefits from use of work analysis data.

Methods engineering, widely used by many large companies to cut costs, is occasionally overlooked by small, job lot plants due to the great variety of work, short runs, and many technical problems involved.

Often, however, analysis of plant operation indicates some common basic characteristics which can be defined and measured. On these data, cost-cutting procedures may be developed.

Steps — Methods engineering consists of four steps. First is analysis of each operation on a given piece of work. Objective is to get rid of unnecessary operations and develop the quickest and simplest way of performing each necessary operation.

Next comes standardization. It involves adopting the best operation, equipment, materials, and working conditions available. Operators should then be trained to follow the specified methods.

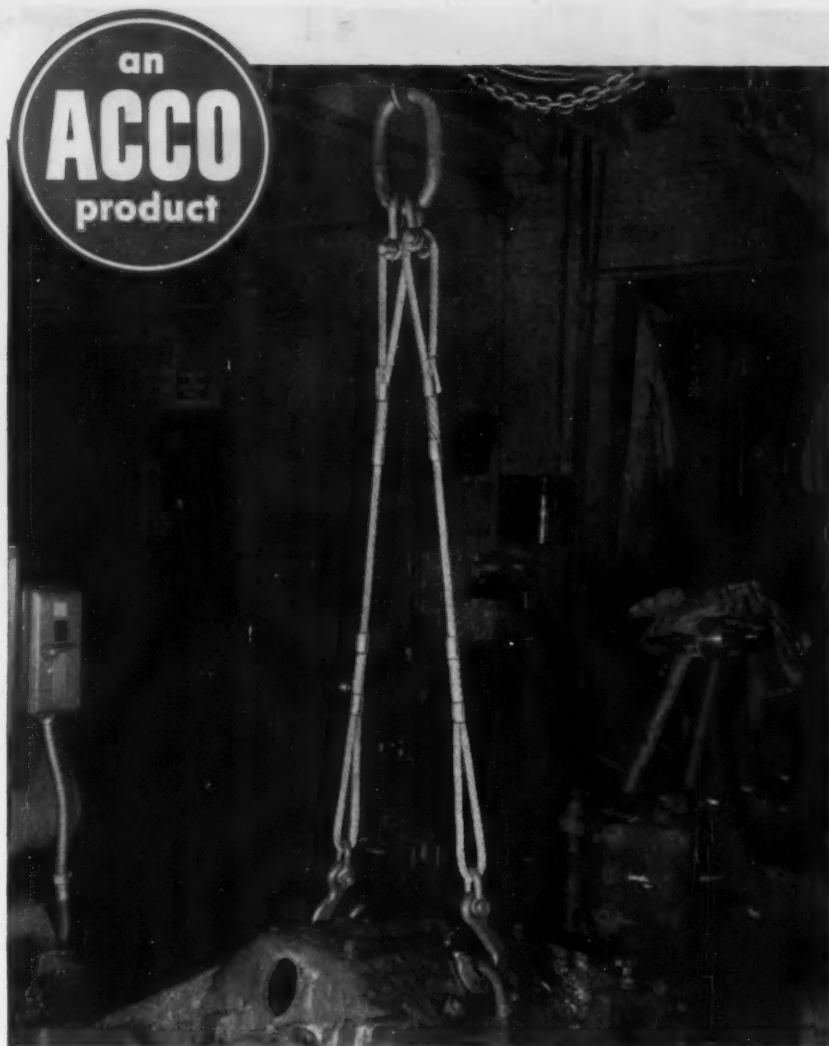
Measurement — Third step is measurement. After the operation has been completely standardized—detailed information is compiled by accurate measurement.

From these data is derived the number of "standard" hours in which a reasonably competent, fully trained operator, working at a normal rate of speed, does the job.

Compensation—Usually, but not always, the methods engineering procedure includes a plan for compensating the workers. The plan is designed to encourage the operators to attain or surpass standard performance. In this way, a sound incentive wage system is developed.

Once fair time standards have been established, a worker will be able to increase his take home pay proportionately as he increases his effort and skill. Similarly, as his production rises, the company will

Turn Page



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- 4 • **These Slings and Fittings are "ACCO Registered"**—This assures you of highest quality and safety throughout.

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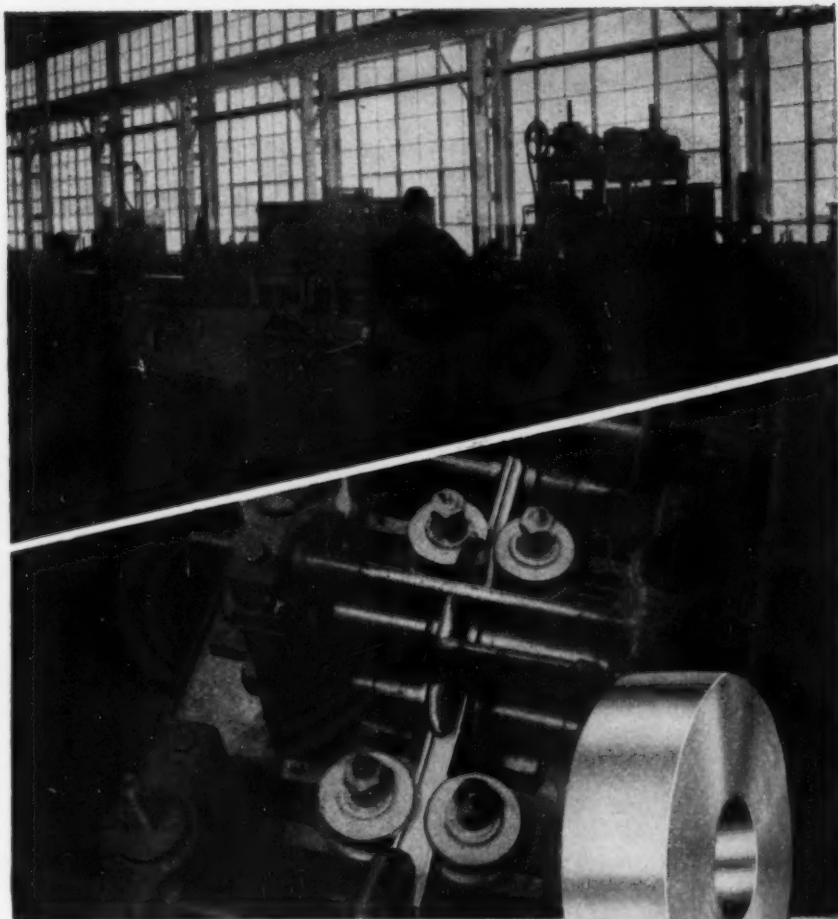


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—Technical Briefs—

achieve higher volume and lower unit costs.

Time standards also serve as a basis for schedule, and control of work going through the shop.

Other Uses — By using time standards, time required to complete an order can be accurately predicted. The information facilitates department and machine loading and gives the sales group more accurate figures on which to base delivery promises.

Some types of work—receiving, shipping, maintenance, and other indirect labor — are difficult to measure with individual time studies. Time required for these jobs, however, can be measured with "time formulas" which permit rapid calculation of time standards for many types of work.

HELP WANTED:

Chicago firm tells the world of personnel needs.

Probably the most unusual means of advertising for help was recently put to use by Poray, Inc., Chicago, manufacturers of metal specialties.

A changeable-copy display sign, measuring 17½ ft long and 3 ft high, was erected atop their building. Translucent, red plastic letters 10 in. high were used to form the message, which is constantly changed as various needs arise. Illuminated back of the glass face of the panel, the display is effective by day and by night.



CHANGEABLE sign atop building of Poray, Inc., Chicago, broadcasts personnel needs of the company.

TINY COUPLING:

Jet fighter refueling eased by use of 10-oz device.

Use of a new flexible fuel-line coupling that will not shrink, swell, or shiver free under high pressure is planned for jets, but other aircraft also will be benefited. The sleeve-and-piston type fitting developed at Lockheed Aircraft Corp. remains flexible, allowing a 40° bend in flight and substantial variation in tube length.

Advantages.—Weight of the fitting is 80 pct less than that of standard fitting, yet provides greater safety against fuel leakage even at three times the pressure. Depending on the seal used, it remains leakproof in temperatures from -65° to 600° F. Added advantages are the small opening required in the plane structure, easier installation, greater range of sizes and ease of tightening. The coupling is made under the tradename of Flexomatic.

ALUMINUM DUCTS:

Frictional resistance lower than galvanized . . . Al ducts smaller

Aluminum heating ducts of standard construction present less frictional resistance than conventional galvanized sheetmetal, F. W. Hutchinson of the University of California recently told the American Society of Heating and Ventilating Engineers meeting in Chicago.

Advantage of aluminum is said to increase with velocity and at high velocities the size of an aluminum duct (for a fixed volume of air handled) would be approximately 10 pct less than the required size of a galvanized iron duct.

Data Limited.—Prof. Hutchinson pointed out that adequate data are not available for determining the possible increase of absolute roughness with diameter, but certain theoretical considerations suggest that a slight increase may be expected.

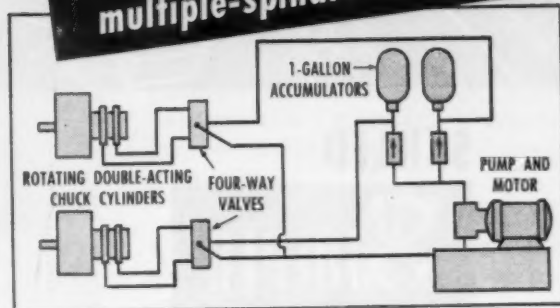
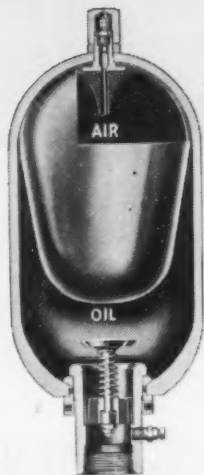
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Greer Accumulators deliver the hammer-like blow on the chuck jaws required to seize and release work on automatic multiple spindle machine tools. In the above simplified, schematic diagram the Greer Accumulator not only supplies power for actuating the chucks but also maintains line pressure for holding the work securely. A low-volume, high-pressure pump charges the accumulator during intervals between chucking. Without the accumulator, a pump to deliver the required surge of fluid would have to be so large and costly as to be economically impractical.

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Technical Briefs

the roughness responsible for loss of head is of two kinds:

(1) Roughness of the material of which the duct is constructed

(2) Roughness due to discontinuities of the internal surface at each joint. These two types of roughness superimpose and combine to establish the experimentally determined absolute roughness.

The roughness of the material would be expected to remain constant, but the joint roughness might well vary as a function of diameter—due to the fact that for fixed 3-ft length of sections, the number of diameters between joints decreases rapidly as the duct diameter increases.

REFRACTORIES:

Bubble-brick has high insulating capacity, light weight.

Lower fuel consumption and closer heat control are possible with a "bubble-brick" developed by Carborundum Co., Niagara Falls, N. Y. Secret of the brick is method of bonding together small hollow spheres of aluminum oxide.

Even though one end of the brick is heated to over 2000°F, the opposite end of the brick may be held in the bare hand.

Cuts Fuel Costs—This high de-



BUBBLE-BRICK, incandescent at one end, can be held in hand at other end. Hollow spheres of aluminum oxide are bonded together to stop heat "flow."

degree of insulating ability, combined with light weight, results in low heat capacity and makes "bubble-brick" particularly suited for furnace construction. Quicker heatup, less fuel consumption, as well as closer heat control, are obtained.

Consisting of bubbles — hollow spheres of aluminum oxide specially bonded together, this material is one of the most heat-resistant refractories available. It has a softening temperature (P. C. E.) value equal to about 3400°F.

The Alfrax BI brick is used in powder metallurgy furnaces, aluminum reverberatory furnaces, ceramic kilns, synthesis gas generators, and other furnace installations.

STEEL TOWER:

Antenna 1218 ft high aids USAF in developing radio use.

One of the highest man-made structures in the world will soon provide Air Research, and Development Command scientists with data required to improve the United States Air Force's use of radio.

This 1218-ft radio tower at Forestport, N. Y., is used by the Rome Air Development Center at Griffiss Air Force Base, N. Y. Beaming experimental radio waves over a wide area the tower fills an urgent electronics development requirement. The tower required 772 tons of fabricated steel and is supported by four miles of guy cables, some anchored almost 1/4 mile from the tower base.

Open—The tower is a vertical antenna of open framework, shaped as an equilateral triangle whose sides are spaced 15 ft. from center to center of the leg members. The tower's foundation rests on sand.

Guy cables had to withstand anticipated wind pressures in addition to dead weight of the structure and ice coating during winter months. Galvanized bridge rope was supplied by Bethlehem Steel Co., Bethlehem, Pa., and by John

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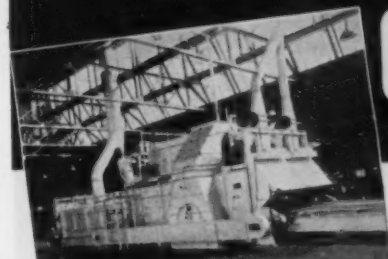
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Two Continental Continuous Controlled Atmosphere Annealers, roller rail type, complete with transfer cars and conveyor systems.



Continental Stamping Annealer, continuous roller rail type, complete with baskets, handling conveyors, and automatic controls for work handling and temperature cycles.



Six Continental "Top Hat" Cover Type Furnaces for bright annealing high-carbon steel, complete with gas generator and automatic controlled time-temperature cycling.

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Paint does not chip or crack on PRE-FOS treated steel.

"SUPERB PAINT ADHESION after cleaning and phosphating with WYANDOTTE PRE-FOS"

says Mr. S. L. Wigodner (right) of L. J. Segil Co.

HAVING trouble with paint adhesion? Then read the report of Mr. S. L. Wigodner, purchasing agent of the L. J. Segil Co., Chicago lighting-fixture manufacturers:

"We can repeatedly bend pieces of steel, which have been treated with PRE-Fos* and then painted, without breaking the paint film loose. We are very pleased with the results of using PRE-Fos.

"Previously, we had tried most of the other available phosphating cleaners with indifferent success. Not only has PRE-Fos given us superb paint adhesion, but also excellent cleaning and corrosion protection. We have found PRE-Fos economical and the solution easy

to maintain and control."

Versatile

Wyandotte PRE-Fos performs well in hard or soft water, in spray washer or soak tank. It has long solution life, rinses freely and completely, prevents rust of steel parts in process, and prepares metals for paint.

If you're painting metals, investigate PRE-Fos. Also ask your Wyandotte representative about our full line of products for better metal cleaning. Wyandotte Chemicals Corporation, Wyandotte, Michigan; also Los Angeles 12, Calif. * Reg. U.S. Pat. Off.



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Wyandotte CHEMICALS

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—Technical Briefs—

Roebbling & Sons Co., Trenton, N. J.

Three Years—Truscon Steel Co. of Youngstown, took 3 years to design, engineer, and produce the shaft. Wickes Engineering & Construction Co., Camden, N. J., completed erection of the tower in December, 1950.

The tower's tapered base section converges at the base casting and provides a single pivot support. An electrically-controlled elevator, used in maintenance and inspection, carries a 700-lb load at the rate of 70-fpm.

High Winds—During final construction work on the tower, winds were recorded at 120 mph. Sway was less than half the seven ft. the tower is calculated to take in a 150-mph gale.

The mast foundation supports 4200 psi. The central pier, on which the main tower rests, is a pyramid mass of reinforced concrete. Guy anchors are of concrete and provide sufficient weight to overcome uplift.

Below—Under the base pivot casting of the antenna is a dome-shaped steel casting. The casting has three contact points with three 400-ton hydraulic jacks which may facilitate a change of the base insulator elements.

Weight—The tower and its supporting guy cables press down a weight of 2,280,077-lb on a single pivot casting, mounted on three porcelain insulator elements.

The porcelain insulator assemblies and dome casting were furnished by the Lapp Insulator Co., Leroy, N. Y., and consist of three triangular-spaced, cone-shaped, porcelain elements pre-tested to a compression of 290,000 psi. The large end is cemented into a casting on the central foundation base plate. The small ends are cemented into a cap bearing casting. The three cap castings provide bearing points for a dome-shaped spider dome.

BIG BITE:

Cutter simplifies cutting chain by mill supply houses.

Chain has always been a difficult mill supply house item to handle. When customers want a piece, the shop men must pull the required length from the cask, measure it off, take the right link to a vise and start in with a hacksaw.

C. W. Marwedel of San Francisco and Oakland, a leading California machinery and mill supply house found a handy answer recently. A manufacturer's representative for H. K. Porter, Inc., of Somerville, Mass., cutting tool manufacturer, noticed a shop man at work on chain with a hacksaw.

Doubles Pressure—He suggested a new cutter with tripod andatchet chain attachment which more than doubles the pressure one man can apply.

The cutter handles chain up to 1/2 in. of 300 Brinell or RC 31 hardness and 3/4 in. threaded bolts in about a half minute. This compares to at least 10 min. for sawing in vise, cold chiseling or acetylene cutting.

Shop men welcomed the 40-lb labor saver because it can be easily carried to the chain cask saving hauling chain to the vise and laborious sawing, often while the customer waits. It is expected to pay for itself in a year in time saving alone.



CHAIN CUTTER with tripod lops cutting time for chains, bolts and rod from 10 minutes to 30 sec.



ALTEN

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of Metal Parts and
Assemblies for Machinery

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Get practical help from our Engineering Department — gain speed and save by sub-contracting medium and large sized intricate jobs involving weldments, machined castings, complete or sub-assemblies. Alten has the size, the equipment, the "know-how."

Facilities include gray iron and alloy foundries, machine shops, with boring mills, automatic and turret lathes, drill presses, screw machines, broaches, milling machines, surface grinders, external grinders, etc. Structural departments for shearing, rolling, punching, forming, gas-cutting, welding and assembly. In all, two modern equipped plants, twenty-five (25) acres.



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FOR MACHINERY MANUFACTURERS — Alten builds machine bases, oil pans, pump and compressor parts, hydraulic components and many other machinery parts.



FOR BUILDERS OF EARTH MOVING EQUIPMENT — Alten makes clutch housings, clutch drums, drum spools, brake drums, wheels, transmission cases, etc.

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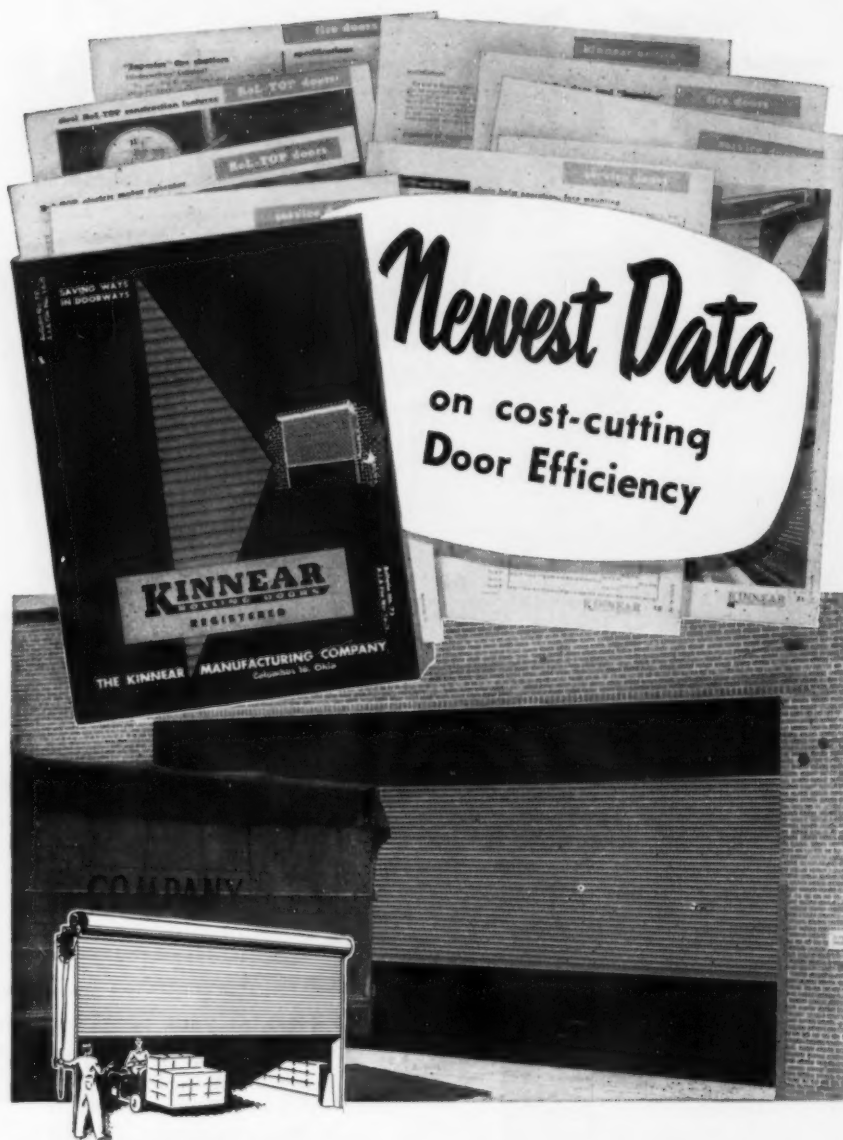
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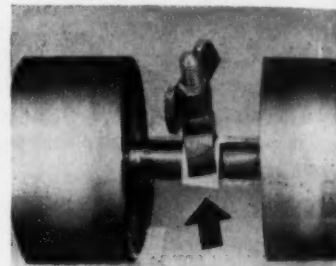
Technical Briefs

NYLON BEARING:

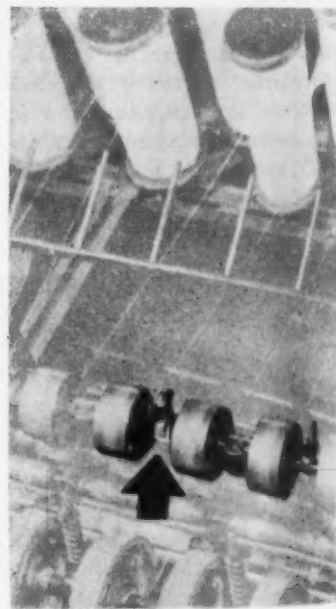
Bearing liner eliminates splash, improves thread uniformity.

Low friction nylon strip requiring no lubrication is finding wide spread application today where contaminated lubricants formerly slowed production and limited product quality. In most instances this means replacement of parts made from metals.

While parts fabricated from nylon maintain low friction properties even without lubrication, they also have an unusual ability to withstand abnormal abrasion and corrosion.



NYLON LINER inserted as above, between bearings, helped stop lubricant splash, maintain constant bearing speed.



MORE UNIFORM and cleaner thread was produced after installation of nylon liner on pressure roll shaft of spinning frame

Solves Bearing Problem — Success of nylon strip in bearings, for example, was demonstrated recently by Nathan Schwartz & Sons, Philadelphia yarn manufacturer.

This firm was trying to overcome production difficulties stemming from poor bearing performance.

Bronze bearings in use on the pressure roll shaft of a spinning frame required constant lubrication. As the grease became viscous with age and picked up dirt, pressures and speeds began to vary. The thread subsequently lost its uniformity, and the lubricants were contaminating the yarn.

Production Restored — Nylon strip made by Polymer Corp. of Pennsylvania, Reading, Pa., was installed. The operation required no alteration of equipment, since these liners were readily installed on the old bearings. This strip, readily formed into long wearing bearing liners, quickly eliminated production problems and grease splash. Constant pressures and speeds were restored, again permitting production of a uniform thread.

Actual life of the nylon liners has not been determined. Original bearings were installed early in 1950. No replacement has been necessary, and none is foreseen.

ASSEMBLY TRAIN:

Lockheed uses tractor to keep line moving.

A push-'em-up production line, using a tiny pushmobile tractor to move en masse a block-long train of jet plane assemblies, is helping speed aircraft output at Lockheed Aircraft Corp., Burbank, Calif.

Rolling on a regular schedule, the tractor-mechanized assembly line was inaugurated to help accelerate production of T-33 jet trainers for the U. S. Air Force and TV-2 trainers for the U. S. Navy.

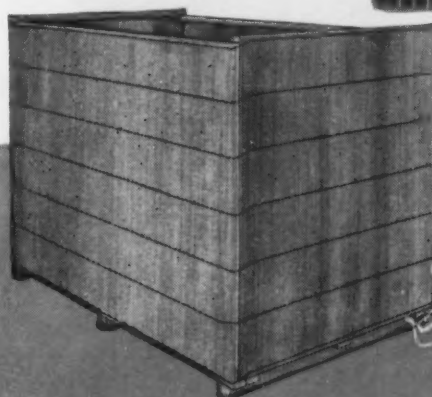
Get Going — With the tractor, Lockheed can advance two lines of trainer assemblies in 3 minutes. Previously it took four men 1 hr to move all the assembly jigs from one work station to another.

The tractor-locomotive pulls up to each assembly line, a string of 4-wheeled assembly jigs riding on rails, every 3.2 hr. When in position, the toot of a whistle warns

Turn Page

February 5, 1953

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It's as costly as this

OR...

as efficient as this



Generalift

PALLET BOXES

Better check today on this versatile, popular container. The Generalift Pallet Box and fork lift truck is a combination that will substantially reduce your materials handling costs! Picture at right shows how many manufacturers are also using Generalift Pallet Boxes for the more economical storage of parts and materials.

Write for your free copy of "The General Box." It illustrates and describes how manufacturers are cutting container costs.



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You're looking at a polished section cut from a Duraspun Centrifugal Casting...a casting with 12-14% chromium. It tells better than words of the high quality of Duraspun Centrifugal Castings.

You get a fine, dense, uniform grain structure. Possible air pockets and blow holes are eliminated. Tensile strength is higher than with static castings.

Order Duraspun if you need pipe or tubing. Sizes run up to 15 feet in length; up to 32 inches OD; and down to 1/4 inch wall thickness. Odd shaped pieces can be produced providing a circular hole passes uniformly down the center. These, of course, require specially designed casting forms.

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— Technical Briefs —



ASSEMBLY LINES are moving faster at Lockheed Aircraft since it started using small tractor to push assembly jigs. Result: Trainer train moves faster.

workers to get set for the line to advance one station. Moments later, a second toot signals them to stand clear, and the tractor shoves the entire 13-station line ahead.

Trainer Train — Each jig carriage has a half-shell section of T-33 forward fuselage mounted on it. The "railway" jigs are hooked together with detachable couplings. On one set of assembly lines, exterior structure work is handled. On two other lines, interior equipment is installed. Each set of lines is moved separately.

During the tractor move, supervisors are stationed along the line to insure that all safety precautions are observed. T-33s are in production also for eight foreign countries under the Mutual Defense Assistance Pact.

Two-Place — The T-33, developed from the original Lockheed Shooting Star jet, is the forerunner of the latest Lockheed turbine-powered plane, the F-94C.

Also a two-place plane, seating a radar operator as well as pilot, the F-94C Starfire is an interceptor unique for its all-rocket armament and ability to spot, pursue and attack its aerial enemies almost entirely automatically, according to Lockheed.

The fuselage is assembled on the half-shell for easier access to restricted interior space. The new method has substantially cut the time needed to position fixtures.

STEEL FRAMES:

Thule Air Base buildings go up fast with standard frames.

New and rapidly-expanding field construction passed another milestone recently at Thule Air Base, America's new Air Force base in northern Greenland.

Twelve of the service buildings at the huge base 910 miles from the North Pole, including the world's largest salt water distillation plant, are standardized steel-frame structures produced by Luria Engineering Co. at Bethlehem, Pa.

Fast Delivery — Standardized structures consist of the three buildings in the 31,968-sq-ft distillation plant, seven 57,288-sq-ft covered-vehicle storage buildings, a 20,008-sq-ft automotive maintenance shop and a 10,824-sq-ft laundry and dry cleaning plant.

Fast delivery of the buildings was needed because outdoor construction at Thule was possible only from April through October. Ease and simplicity of erection—no welding or riveting required—shortened the erection period substantially.

Big Spans—Wide-span, column-free interiors provided space for large tanks, equipment and auto trucks. Distillery buildings, for example, each have 72-ft spans, 148-ft lengths and 16-ft eave heights.

The automotive maintenance

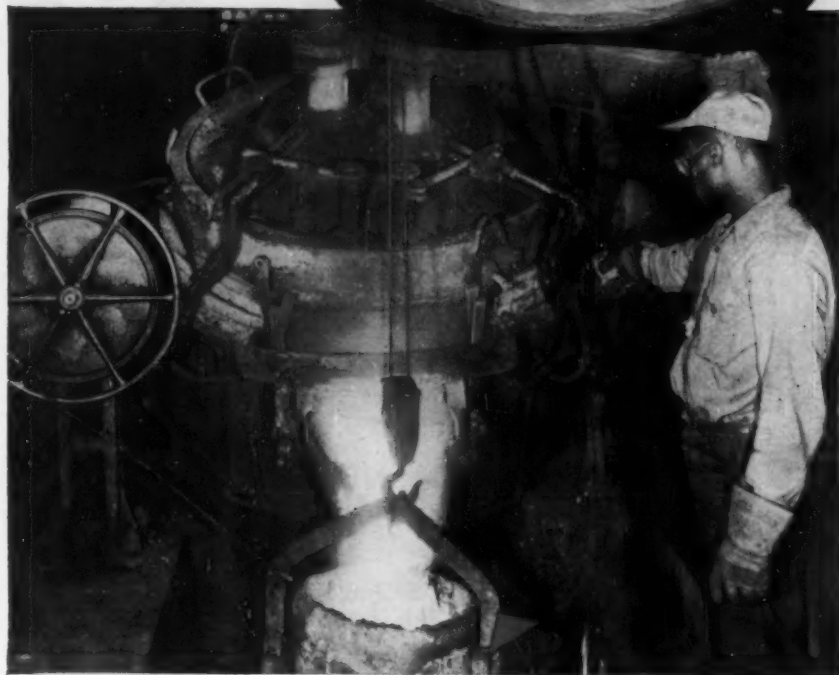


WORLD'S LARGEST salt water distribution plant, at Thule Air Base, Greenland, was put up in record time by using standardized steel frame service structures.

Turn Page

SHAMVA®

RAMMING CEMENT HERE



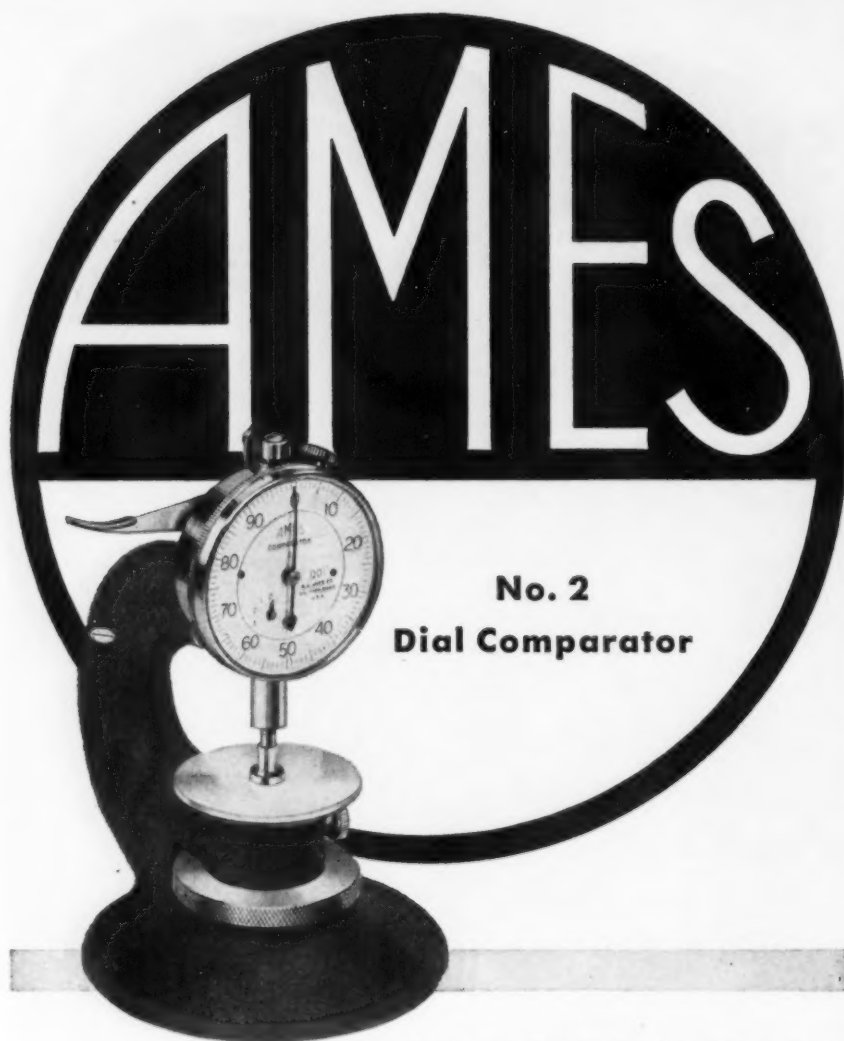
PAYS OFF FOR FERRO MACHINE HERE

Ferro Machine & Foundry Inc., Cleveland, Ohio, one of the largest independent gray iron foundries in the U.S., has been in business over 40 years. Their specialty is automotive type castings. To keep production up, Ferro puts 38 tons of high strength alloy iron through a "Q" Lectromelt in 16 hours. At 2900° this pace has been death on furnace roofs. Using special shape silica roofs, Ferro was getting a service life of 4 weeks per roof. After switching to Shamva 65G ramming cement, Ferro now reports an increase of roof life to 7 weeks.

Shamva cements, as well as Shamva brick and shapes, can do a job for you, too. Why not see what Shamva can do for your production curve. Our field engineers will be glad to discuss it with you.

THE MULLITE REFRACTORIES CO. SHELTON, CONN.

In Canada, Shamva Products Co., Ltd., Niagara Falls, Ontario.



**No. 2
Dial Comparator**

This is smallest in the Ames' line of high quality dial comparators and it is ideal for desk or bench use in the fine inspection of small precision parts. It is light in weight, but its broad base makes it very stable. The capacity approximates that of the regularly supplied Ames No. 202 Dial Indicator which has a dial numbered 0-100, graduated in .001" and with a .250" range.

Should your job requirements differ, you can have the No. 2 with any Ames "Hundred Series" Dial Indicator. Send for

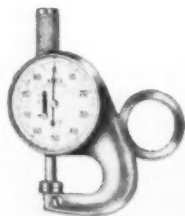
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—Technical Briefs—

shop and laundry and dry cleaning plants have 82-ft spans.

Of the 585 tons of structural steel shipped only one part went astray on the 2600-mile voyage. A heavy roof rafter went overboard

Rafter By Plane—To meet the emergency, Luria rushed another by plane, but the rafter had to be cut in two in order to get it inside the aircraft. It was spliced when it arrived at Thule later.

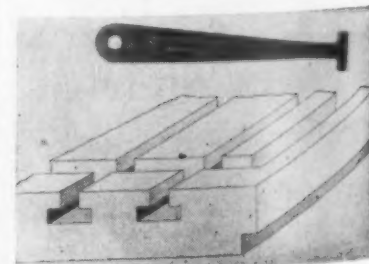
Because of Thule's permafrost or permanently frozen ground subject to alternate freezing and thawing, heavy structures like those made by Luria had to be "air-conditioned."

Air ducts beneath the pads of crushed rock and soil (upon which the buildings rested) and double walls permit the cold to circulate under the structure and prevent interior heat from thawing the permafrost below.

Record—Shipment of the frames set a delivery-speed record under tight supply conditions. Use of the standardized buildings shortened the erection time required, saved many man-hours of labor and provided wide-span, column-free interiors for large tanks, equipment and auto trucks.

Free T-slot Chip Cleaner

A machine tool slot cleaner, usually a handy homemade gadget, is being offered free by Dayton Rogers Mfg. Co., Minneapolis 7, Minn. It's made of 1/8 in. cold-rolled steel and rustproofed. The cleaner may be had free by writing Dayton-Rogers on your company letterhead.



MACHINE TOOL slot cleaner is a simple gadget to help keep chips from T-slots on planers, milling machines and other tools

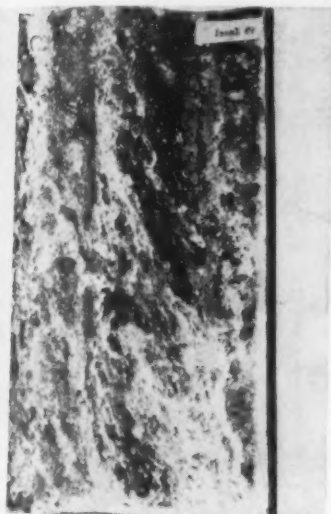
PROTECTION:

Resin-based coatings stand up in salt spray tests.

Galvanized iron treated with a Vinylite resin-based coating lasted twice as long as ordinary galvanized iron under severe conditions of a salt spray fog cabinet test before showing any signs of corrosive breakdown.

The tests, conducted by an oil company in the Texas Gulf Coast area, compared durability of these coatings with iron oxide primer and galvanizing under the same severe corrosive conditions.

No Breakdown — Exposed for 1204 hr continuously in a salt



UNCOATED PANEL, tested at the same time, same conditions, lasted only 672 hr.

spray fog cabinet, one panel of corrugated, galvanized iron, unprepared but treated with a wash primer and top coat based on Vinylite resins, showed no signs of corrosive breakdown throughout the test.

An uncoated panel lasted only 672 hr under the same conditions before the galvanizing completely deteriorated.

Synthetic Sea—The salt spray fog cabinet test consists of a continuous fog of synthetic sea water at 92° to 95° F and at 100 pct humidity. Similar tests under these conditions revealed the su-

Turn Page

Speed Up Material Handling WITH A UNIT 357

It's SELF-PROPELLED
It RIDES ON RUBBER

Tough operating conditions mean nothing to this rugged, service-proven mobile crane. Operates with top speed, ease, and economy in any season or weather. It's designed to handle all types of jobs . . . dismantling, moving or erecting machinery . . . loading and unloading structural iron, pipe, bars, lumber and equipment of all types. Takes high cost and hard work out of material handling jobs for trouble-free, reliable operation. Reduces operator fatigue and increases production.

The UNIT 357 has quick and easy maneuverability, even in cramped yard operations. It is operated by ONE man . . . powered by ONE engine . . . swings in a 360° circle. Streamlined FULL VISION CAB gives operator complete visibility in all directions. Speeds up job. Promotes safety.

Get the complete 357 story . . . its low cost . . . its fast delivery . . . its many modern and exclusive features. Write for Catalog L-301.



UNIT 357 Mobile Crane equipped with clamshell bucket. Can also be had with crane hook or magnet.

Crawler and Mobile models — 1/2 and 3/4 Yd. Excavators. Cranes up to 20 tons capacity.

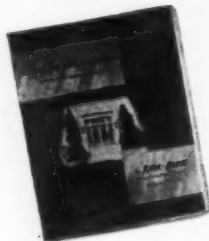


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Whatever your requirements in sheet, plate and alloy fabrication, Kirk & Blum can produce for you . . . economically and quickly.

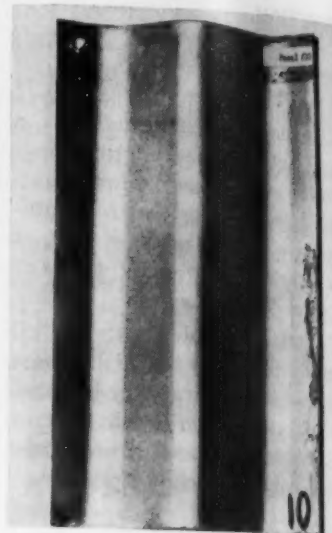
Complete facilities to 1/2" capacity for square and rotary shearing, braking, forming, rolling, punching, riveting, welding, grinding, drilling and finishing sheets and light plates and structurals.

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Technical Briefs



NO SIGNS of breakdown after 1204 hr. showed in this salt spray tested piece of corrugated galvanized iron. Wash primer, Vinylite resin top coat were used.

perior protection of resin-based coatings for both wire brushed and sandblasted black iron, which were degreased before treating.

Two black iron test panels, both degreased and wire brushed, were also exposed in the salt spray fog cabinet for 1204 hr.

The panel with a coating based on Vinylite resins showed no corrosive breakdown except at an uncoated, unprotected hole while the same panel with a conventional coating of iron oxide primer showed poorest resistance.



GIANT CONVERTER, a big welded job, destined for a steelmaking plant in France, is shown here being loaded on Rhine River boat. Converter takes charge up to 50 tons and is over 18 ft in diam, 26 ft high. Total weight is 51 tons.

WHEEL FORGING:

English plant turns out 60 railway wheels an hour in new setup.

Railway wheels and disks ranging from 24 to 50 in. in diam are being turned out at a continuous rate of 60 pieces per hour in a new forging plant set up by Taylor Bros. & Co., Ltd., Manchester, England.

The completely new wheel forging and rolling plant at the Trafford Park Steel works was set up at a cost of more than £1,000,000.

Handling — Distinctive feature of the new plant is the extensive use of special manipulating machinery fitted with individual oil hydraulic units. Economies in power have been effected by the use of air-loaded accumulators in conjunction with the main hydraulic



DESCALER has 12 nozzles each of which sprays 27.2 gal of water per minute on hot block. Six are located below the block.



COMPLETED FORGING as it comes from the 8500-ton press. Here the block is given basic wheel contour.

Turn Page



THIS PICTURE TELLS A STORY of a new cost-cutting opportunity for steel mills

Note the ready accessibility of each item of steel in this storage yard of a well-known steel mill. It's this availability of materials that's one of the prime advantages of the ROSS STRADDLE CARRIER handling method . . . an advantage, unmatched by any other method, that eliminates delays, lowers costs and increases the production efficiency of the mill.

ROSS STRADDLE CARRIERS, heart of the Ross unit-load handling system, are built to handle 45,000-pound concentrated loads on around-the-clock schedules in the roughest, toughest steel mill service . . . to put those loads *where* wanted *when* wanted.

Your mill, too, can profit by this modern, flexible mass handling system. Get in touch with Ross today for the complete details.



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Technical Briefs

Continued

plant to regulate the operating pressure.

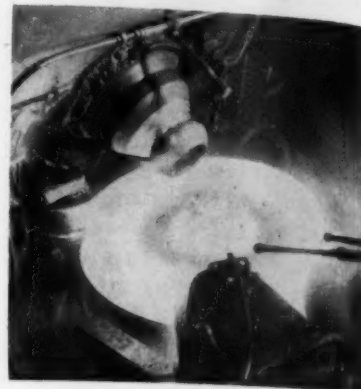
Blocks of steel from which the wheels are made are cut or broken from a cross-sectioned ingot 125 x 16 x 18 in. across flats.

To Furnace — Billets move by gravity roller conveyor to a furnace charger. The charger places them in radial rows on the hearth of the rotary furnace. The blocks

are automatically discharged to a transfer car. This car transfers the block through a hydraulic descaling machine to the 8500 ton hydraulic press.

After slabbing down between flattening tools the bloom is transferred to forging tools mounted on sliding tables on the bed and crosshead of the press.

Forge Hub — Under increased



WHEEL is rolled to give proper contour to outside diameter, edges. Rolls are hydraulically controlled.



CAREFUL CHECKING assures wheels are up to standard as they come from press. After final dishing, wheels are stamped for identification, sent to cooling beds.

pressure the slab is forged to finish the hubs, partially form the bore and prepare a rim section suitable for rolling.

The complete forging is transferred from the dies to a live roller table by an unloading mechanism and conveyed to 1000-ton punch press.

Fall Through — Punched slugs fall through a hole in the lower die to a quenching bin. The punched wheel passes to the rolling mill.

Rim sections are rolled to required contours in the rolling mill. An unloading mechanism takes the rolled wheel from the mill and, by means of a transfer car, the almost completed wheel is carried to the 2000-ton dishing press. After dishing, the wheel is stamped with identification numbers and transferred either to a five station rim chilling machine or direct to a cooling bed.

"as a diemaker I have never seen ANYTHING like it!"

MORE THAN 264,000,000 PERFORATIONS WITHOUT BREAKING A SINGLE PUNCH!

PIVOT HIGH SPEED STEEL PUNCHES
STRAIGHTGROUND • WHIPSLEEVED

A Powell Steel product required 32- $\frac{3}{4}$ holes and 16- $\frac{3}{4}$ holes in 8-inches of .018 electro galvanized steel, automatically roller fed into press and rolling machine . . . a job for any punch! The 48-punch die was equipped with Pivot Straightground Whipsleeve Punches and 5,500,000 strokes have already been run without breaking or replacing a single punch . . . and it's still going strong!

In addition to providing complete dependability, Pivot Punches have the concentricity and power that assures more accurate stampings and longer punch life with minimum maintenance cost. Whatever your perforation requirement, put Pivot advantages to work for you as soon as possible.

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NORTH TONAWANDA, N. Y.

Powell Steel Products, Chicago, pioneers of simplified design in plastering accessories, used the advantages of Pivot round punches to replace customary triangular perforations in metal plaster lath. This resulted in savings in tooling, increased production and lower maintenance cost. Mr. William Dempewolfe, Supervisor, says "As a Diemaker, I have never seen anything like the Pivot Punch. It is one of the best things that has come into the diemaker's business in a long time."

QUALITY CONTROL:

Discovery sampling paves way for lower control costs.

Lower costs in statistical quality control work may be possible through application of an unusual statistical inspection method for the shop doing job-type work.

Discovery sampling (see THE IRON AGE, p. 114, Jan. 29, 1953) was developed by James R. Crawford of Lockheed Aircraft Corp., Burbank, Calif., and described in a paper presented at the Fifth Annual Industrial Engineering Institute, held at the University of California, Los Angeles, this week.

Basic to the discovery sampling method is establishment and measurement of levels of quality by production areas.

While parts are of different shape, they are made on similar machinery and have common characteristics. Each lot of different parts constitutes a sample of this process.

Induction Heating Studied

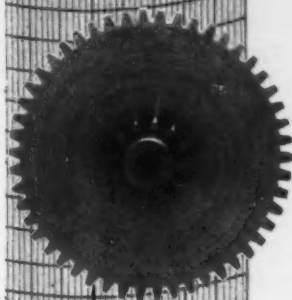
Experimental studies on the influence of induction heating on the properties of steels are being conducted at Lehigh University.

To control test samples heated in the Lepel high frequency induction furnace, a Leeds & Northrup Rayotube sights on the sample through the opening between windings of the induction coil. A Speedomax controller automatically records and controls the temperature.



CLOSER CONTROL of temperature where steel samples are induction heated is possible with these controller units.

NO. 00 HAMILTON PRECISION SMALL GEAR HOBBER



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HOBBER 4
48 D.P.
50 T.
20° P.A.

**less THAN
.0001" COMPOSITE
error!**

Spur gear: brass: 48 diametral pitch;
50 teeth; 20° pressure angle: less than
.0001" composite error: generated on
Hamilton No. 00 Precision Gear Hobber.

DEMANDS for mechanical accuracy become more and more insistent as new and improved designs reach production. And machine tools, purchased without consideration for future accuracy requirements, become obsolete before they are depreciated.

Protect your investment in gear generating equipment. Buy the one small gear hobber which is precise enough to meet future requirements, and rigid enough to hold its precision. Buy Hamilton!

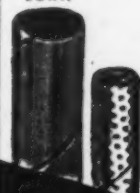
ACTUAL TEST (see illustration at left) made before secondary operation. Heavy lines equal .001"—light lines equal .0002". Gear made .004" undersize to allow for secondary operation.



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GRAIN-ORIENTED:

Production of electrical steels with higher permeability seen.

Continued from Page 152

the small grains are due to secondary recrystallization. These new large grains which grow out of the fine-grained matrix have the desired (110) [(001)] orientation texture. Experience and research have proved that the (110) [(001)] texture is extremely sensitive to small amounts of non-metallic impurities, 0.02 pct N₂ being sufficient to inhibit its development.

While non-metallic impurities inhibit the development of the (110) [(001)] texture, the metallic elements when present in small amounts may either accelerate or have no effect whatsoever, either

upon the rate of nucleation or growth of the grains.

When the core of a transformer is magnetized it experiences a change in length, of the order of 10⁻⁶. The joule magnetostriction is expressed by the relation

$$\lambda = \frac{\Delta L}{L}$$

The value of λ in single crystals has been found to be dependent upon the direction in which it is magnetized. In grain-oriented silicon ferrite the value of λ is minimized in the [(100)] direction. Furthermore, λ in addition to being dependent upon crystallographic direction is also sensitive to chemical composition.

Zero magnetostriction

A 6.4 pct silicon ferrite has zero magnetostriction, and this is the composition at which atomic ordering can be observed by means of X-ray diffraction. Magnetostriction and domain orientation

are related and the magnetostriction of grain-oriented silicon ferrite must therefore depend upon the initial distribution of the domains which comprise each crystal.

The magnetostriction causes transformer cores to vibrate when operated at 60 cycle current. In other words, the core is elongated and contracted 120 times each second, and where the changes in core dimensions accompany magnetization are large, the transformer cores emit loud noises which are undesirable. Transformers using grain-oriented strip do not vibrate excessively.

Magnetostriction can be reduced by applying tension to the strip while being subjected to strand annealing. The best annealing temperature as found by Burgwin is in the range 825°C. to 700°C. and a tension of 500 lb to 2,000 psi, below the elastic limit applied for 1 to 2 min.

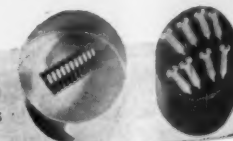


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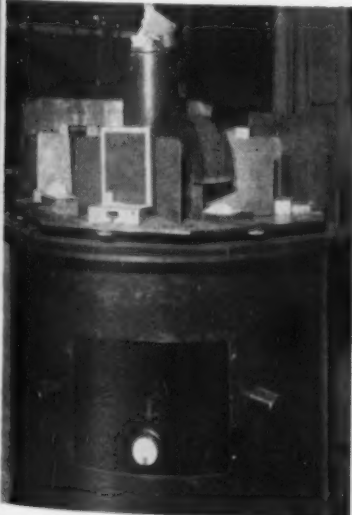
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annealing
Burgwin
to 700°C.
to 2,000
it applied

Oriented strip must be utilized so that the direction of magnetization will always coincide with the rolling direction. This requires the cores to be made in a limited number of ways, (1) The core must be made of sheared laminations so that the flux direction will coincide with the rolling direction, (2) Or the core must be wound in the form of a continuous coil.

At the present time the larger power transformers are constructed according to the first method, however, the smaller distribution transformers are made according to the second method. The Westinghouse Electric has developed the well known Hypersil core, and the General Electric, the unique Spirakore.

Rectangular Cores

In the Westinghouse transformers the cores are wound to the desired rectangular size. After this they are strain annealed, to relieve winding strains; these cores are then impregnated with thermosetting plastic, which insulates the laminations and makes the cores solid. These are cut in half and the ends of each half ground and highly polished and etched to remove strains due to polishing. When the halves are reassembled



One of the earlier type X-ray machines used by the author during the original research program on oriented strip.

Turn Page

How many sections do you need?

90° CURVES

10'-0"

STRAIGHT SECTIONS

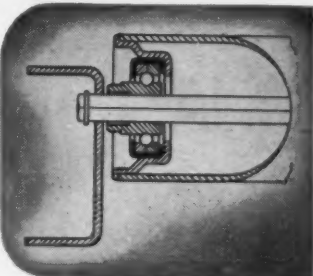
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- BEARING**—No. 50. Slip fit in cup, easily removed and replaced. Protected position—set back from end of roll.
- FRAME**—3 1/2" x 1 1/4" x 10 Ga. Pressed Steel Channel. With four 1-5/16" O.D. 13 Ga. Welded Tubing ties per 10'-0" section. Capacity 75 lbs. per foot with supports on 10'-0" centers and 380 lbs. per foot with supports on 5'-0" centers.
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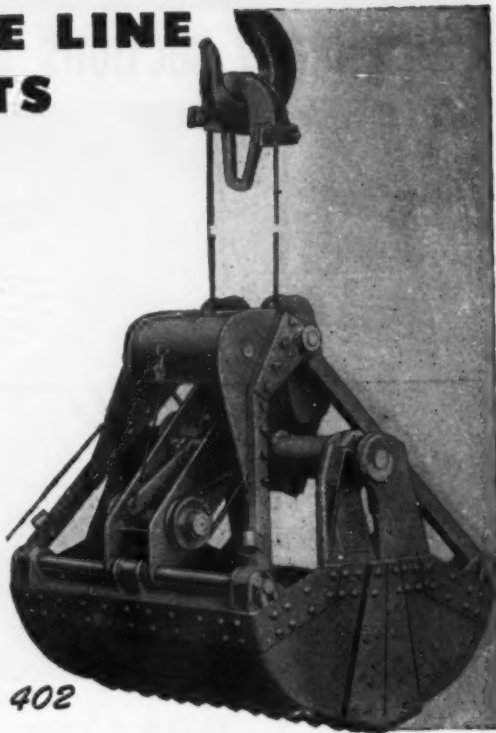
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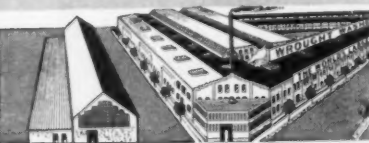
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Technical Briefs

the ends match quite perfectly. The coils are placed around the core sections before final assembly. The joints have an air gap which is less than 0.001 in. This method of transformer construction is very simple, efficient, and in case of coil failure, they can be easily repaired. Westinghouse has recently announced the development of a new line of Hypersil cores for use in electronic transformers. To increase added mechanical strength the strip is ribbed.

Core preformed

In the General Electric process the core is preformed, and then wound about the coils. This method has the advantage of utilizing the strip without resorting to cutting. However, in case of coil failure, replacement is more difficult. A third method suggests itself, in which the coil would be wound on the core. This method is being tried to a limited extent at the present time.

An advantage

Thin grain-oriented strip is also available for use in transformers operating at 400 cycles. This material is supplied in coils down to 0.004 in. thick. Some 0.001 in. strip has been produced, in small quantities. The advantage of this thin grain oriented strip is its low exciting current at 16,000 kilogauss. The best grade is by selection. The use of grain oriented strip in turbo-generator stators was described by Anderson and Fontaine.³ Grain oriented strip is also used in television circuits, and servomechanism transformers. Grain-oriented silicon ferrite is also finding increasing use in this field of magnetic amplification. Magnetic amplifiers are becoming a serious competitor, of the electronic amplifier, the main advantage being that such amplifiers are rugged and have no filament to burn out.

¹ T. W. Lippert, "New Silicon Steel Commands Itself to the Electrical Industry," *The Iron Age* Feb. 21, 1935, p. 23.

² Patent 2,144,200

³ Anderson and Fontaine Trans. AIEE, Vol. 70 1951, p. 836.

CENTERLESS GRINDER:

Abrasive belts speed production of extruded tubing.

Elements of a new centerless grinder are two abrasive belts which remove 2 lb of stock from a 15-ft length of 2.375-in. OD steel tubing in 2 min. The new machine, developed cooperatively by Behr-Manning Corp. and Production Machine Co., removes cylindrical stock faster than by any other precision method of grinding.

A 50-grit continuous aluminum oxide waterproof abrasive belt 9-in. width and 168-in. long does the grinding. A 22-grit aluminum oxide waterproof abrasive regulator belt of 9 3/4-in. length feeds the work past the grinding belt.

Contact Wheel—Mounted on a 4-in. shaft, a steel contact wheel weighing about 350 lb supports the grinding belt against the work and serves as a belt drive pulley. Driven by V-belts from a 25-hp motor, the 20-in. diam wheel forces the grinding belt past the work at 3500 to 10,000 sfpm.

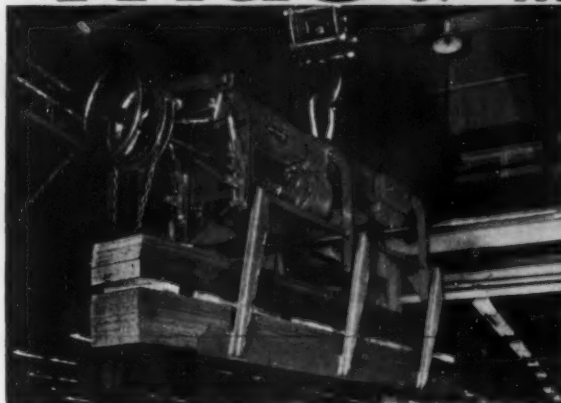
The regulator belt assembly consists of the abrasive belt, variable speed drive, idler pulley and a flat steel back-up platen. This assembly can be adjusted to a work feed angle of 0° to 15° from the vertical. Angular adjustment and the variable speed drive makes it possible to vary the work feed rate from 0 to 30 fpm.

Purposes—This method of grinding, using cutting oil as a lubricant, will (1) remove stock from extruded tubing at a faster rate, (2) remove Fiberglas skin and extrusion die marks, (3) remove taper from tubing and (4) provide an acceptable finish.

Tests on 12 bars of Timken 52100 alloy steel showed that the belt removed as much stock during the last pass on the twelfth bar as was removed during the first pass on the first bar.

Because of rigid machine construction and the high ratio of horsepower to belt width (about 8 hp per in. of belt width), very high grinding pressures can be developed.

Wide or Narrow...



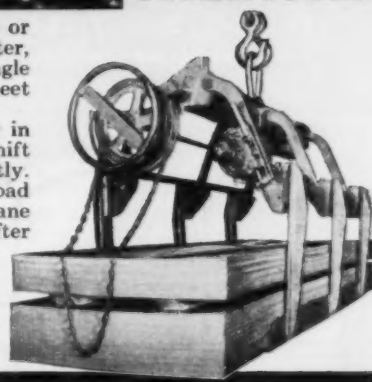
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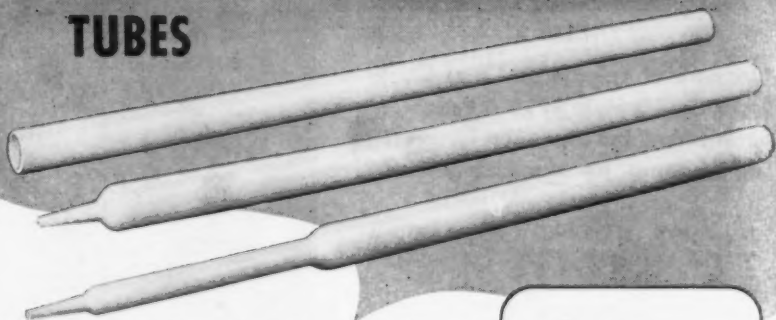


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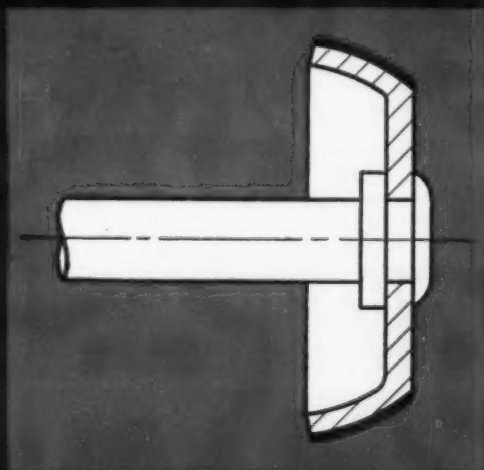
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Ex-Cell-O Style 2112-A
Precision Boring Machine.



Partial sectional view of assembly
shows the operation in heavy lines.

Close-up of spindle and tool block
on Ex-Cell-O Style 2112-A Precision
Boring Machine equipped for preci-
sion turning an accurate radius.



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Precision Turning

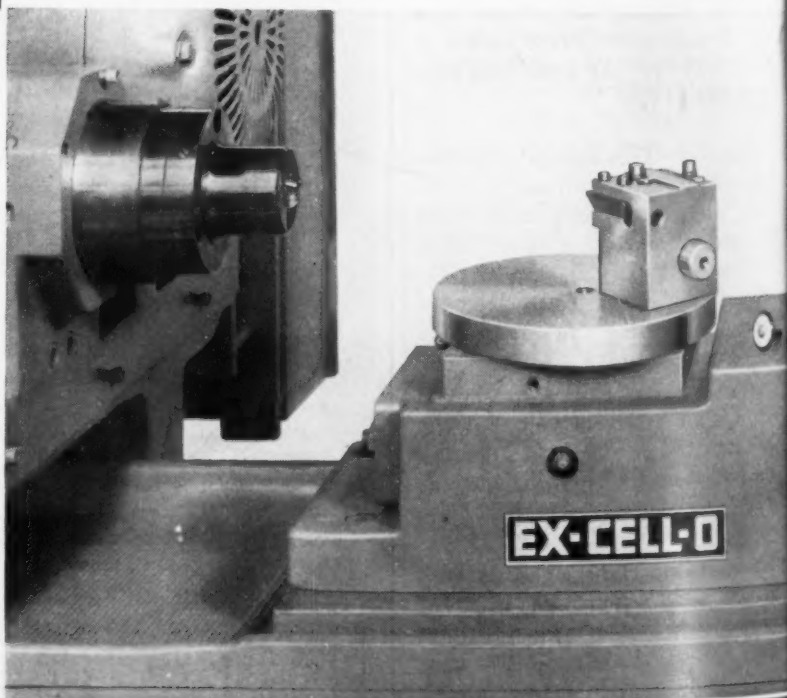
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The stainless steel assemblies are held in a collet chuck on the spindle. The turning tool is held in a tool block on a turret which is actuated by a hydraulic cylinder through a rack and pinion. Net production is 109 pieces per hour.

For further information on the many uses to be made of Ex-Cell-O Precision Boring Machines, see your local Ex-Cell-O representative or write for Bulletin 31205.



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1952 Steel Earnings Skidded But Finished Strong

Earnings were down 22 pct from previous year, but fourth quarter showed sharp gain . . . Profit margin shrinking . . . Strike at Inland Steel causes ingot rate to dip.

Steel industry earnings last year skidded about 22 pct below their 1951 level.

But income in the fourth quarter of 1952 was about 20 pct higher than it was during the fourth quarter of 1951.

The relatively poor showing last year resulted largely from the 4-day strike that cut deeply into operations and profit in both the second and third quarters. The fourth quarter upsurge in earnings marked quick and complete recovery from the paralyzing effects of the strike.

Industry profit data were compiled by THE IRON AGE from preliminary earnings reports of 16 steel companies representing about 82 pct of the industry's ingot capacity.

Down Again—Declining profits last year caused some concern to steelmakers who recalled that 1951 profits had in turn dropped 13.2 pct from the more bountiful levels of 1950.

In addition to the steel strike, producers blamed inadequate price relief to compensate for a record wage increase and increasing costs of goods and services for their poorer profit showing.

Though the strike undeniably cut deep inroads into production and profits last year (production loss was placed at more than 19 million net tons) 1952 was hardly a year of depression. The industry poured 93.2 million net tons of raw steel (third highest in its history) while operating at an average rate of 85.8 pct of rated capacity.

Margin Narrows—Last year's financial results clearly demonstrate that profit margins are still getting narrower. For example, U. S. Steel Corp.'s net income was only 4.6 pct of sales last year com-

pared to 5.2 pct in 1951. In 1950 it was 7.3 pct. The corporation represents about one-third of the steel industry.

Despite last year's relatively poor showing, the earnings outlook for 1953 is fairly favorable. The same factors that brought marked improvement during the fourth quarter are still present in the economy.

Added to them is a strong hope for tax cuts (especially the so-called excess profits tax), junking of price controls, and labor peace. If all these things come to pass, 1953 could be an excellent year, for demand still shows no sign of failing.

And it is generally conceded that the industry will enter the second half producing at or near its rated capacity.

Take Everything — Steel consumers are still absorbing record shipments of finished items, with no sign of relaxing their aggressive procurement efforts. But there are indications that peacetime product relationships are beginning to be restored.

In Detroit, for example, sheets seem to have replaced bars as the tightest item in the market. Though still by no means easy, bars are in better supply. This is true of rounds, squares and flats, even though not all sizes are available at all times.

For several months larger-sized bars have been the tightest item in the market—if any could be termed so. Competition for both sheet and strip is intense, with little difference between hot-rolled and cold-rolled.

Over Quota — Improvement in bar supply does not mean that steel demand has softened in that area. On the contrary, auto makers, though authorized to

build 1,250,000 cars during the first quarter, are currently producing at the rate of 1,400,000. This doesn't mean they are rushing headlong into a legal tussle.

The auto industry was permitted to add to first quarter production any authorized production it did not take advantage of in 1952. Furthermore, any plant can borrow on second quarter allotments after Mar 15. By taking full advantage of these factors the industry might legally stretch its first quarter production as high as 1.5 million cars.

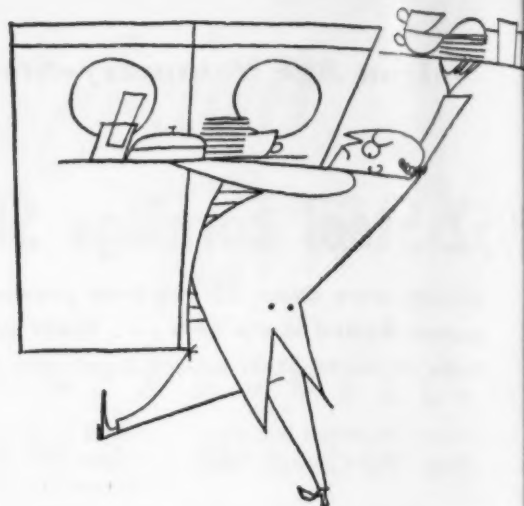
Still Hot — The catch is that steel for considerably less than scheduled production has been allotted by National Production Authority. It is estimated that steel for only 85 pct of the 1,250,000-car allotment has been authorized. The resulting scramble for steel to catch up with production limits is keeping this market hot, in addition to exerting pressure in other areas.

Stamping plants supplying auto and appliance industries report a terrific rush of "emergency" orders. In many cases production runs are not so long as they would like, but pleas of urgency are reminiscent of their banner year of 1950.

Plate deliveries show some improvement, though shortage of hot-top quality plates continues to harrass some consumers.

In Demand — Pipe is tight as ever, and the outlook is that it will stay that way for some months. One important producer has commitments on casing and drill pipe extending into 1954.

Steelmaking operations this week are scheduled at 96.0 pct of rated capacity, a decline of 3.5 pct from the previous week. At press time operations in the Chicago district were still cut back as a result of a wildcat strike at Inland Steel.



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Market Briefs and Bulletins

Conversion Still Active—Conversion steel market is reported firm as ever in the Midwest. One mill says its semifinished output is sold out almost through the entire second quarter. Company states that greater availability of its semifinished products does not indicate a weakening of the strip market. Reason for increase is lag in finishing capacity, which leaves more semifinished for the market.

More Stainless—Production of stainless steel ingots continued to increase as a percentage of total steel production last year, according to American Iron & Steel Institute. Preliminary report placed last year's production at 901,831 net tons, or nearly 0.97 pct of total raw steel output.

Production Cutback—Lack of orders for soil pipe in the southeast is causing production cutbacks. Majority of pipe producers are now operating on a 3-day schedule as compared with the double-shift, full-week tempo of 2 years ago. Cast iron pipe manufacturers have eliminated their second shift but are still operating on 5 and 6-day schedules.

Better Supply—Exhibitors at Chicago's Heating & Ventilating Exposition last week reported supply conditions are generally improved. Castings and galvanized sheets were said to be in fair supply; copper is still tight; cold-rolled sheet is in strong demand, but strip has eased.

Canadian Ferroalloys—Canadian production of ferroalloys in October amounted to only 19,152 net tons, compared with 25,777 for October, 1951.

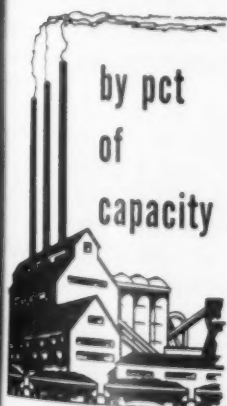
Inland Shutdown—Wildcat strike of 18,000 workers at Inland Steel Co., Chicago, unsettled at press time, has caused loss of 12,300 tons of ingots each day since employees walked off the job at midnight, Thursday, Jan. 29. Dispute arose when three workers were suspended for refusing to work overtime to make emergency repairs on a pugh ladle. Strike started before negotiations with the union had achieved any results. Openhearth and blast furnace operations have been discontinued and the plant is on a standby basis.

Price Increase—Harbison-Walker Refractories Co. has increased price of deadburned grain magnesite, standard grain, f.o.b. Chewalah, Wash., in bulk, by \$1.70 per ton to \$38.00. The company's furnace magnesite, in bulk, f.o.b. Chewalah, went up \$1.65 per ton to \$44.00. Sacking charge has been increased 25¢ per ton to \$5.75. Baltimore price rose \$1.70 per ton to \$64.40, and furnace grade moved up the same amount to \$70.45. Sacking charge at Baltimore was increased 35¢ per ton to \$7.50.

Metal Needed—Need for greater metals production in the Texas Gulf Coast area is pointed up in a survey of local manufacturers made by Houston Chamber of Commerce. A total of 73 plants questioned said that more steel production is needed, and 14 manufacturers indicated a need for aluminum fabricating plants. Nine other plants said they would benefit if there were more brass, bronze and copper materials producers in the area.

Warehouse Stocks—Some midwestern steel warehouses report stocks are now up to 55 and 60 pct of normal, but they are still having a tough time with cold-rolled sheet, plates, bars and structurals. A few have sufficient inventory to open up branches.

STEEL OPERATIONS

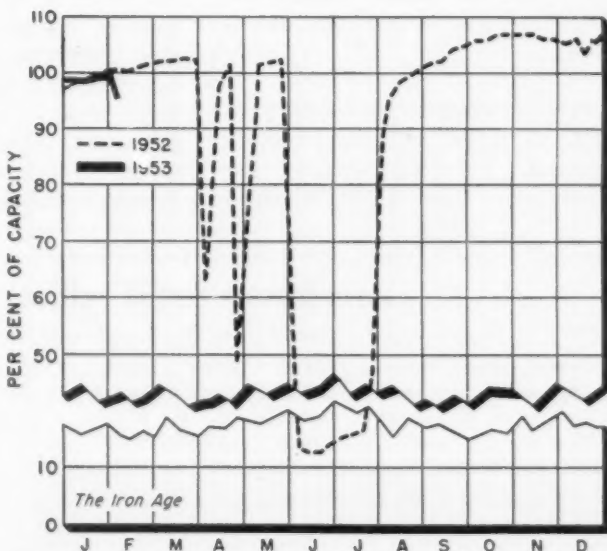


District Operating Rates

District	Week of Feb. 1	Week of Jan. 25
Pittsburgh	107.0	107.0*
Chicago	81.0	97.5*
Philadelphia	96.5	96.0
Valley	102.0	102.0*
West	104.0	106.0*
Cleveland	98.0	95.5*
Buffalo	94.0	94.0
Detroit	104.0	104.0*
Birmingham		
(South)	98.5	96.0
Wheeling	101.0	101.0*
South Ohio River	93.5	93.0
St. Louis	105.5	101.0
East	81.0	96.0*
Aggregate	96.0	99.5

Beginning Jan. 1, 1953, operations are based on annual capacity of 117,522,470 net tons.

* Revised



The Iron Age

February 5, 1953

Nonferrous Markets

Wheland Co. Enters Third Round

Seventh producer set to build \$70 million, 50,000-ton aluminum smelter with TVA power . . . Price lid is coming off . . . Copper to rise, others won't change much—By R. L. Hatschek.

It looks as though the government's third round expansion of the aluminum industry is going over with the biggest bang. It isn't the biggest tonnagewise even though it now totals 214,000 tons of annual capacity.

What makes it noteworthy is the number of new producers brought into the picture. Defense Production Administration this week was getting ready to issue a certificate of necessity to the Wheland Co., Chattanooga, Tenn., for completion of the third round.

Number Seven — This is the third new firm scheduled to build aluminum smelting facilities under the third round and it brings the total projected industry to seven producers. Others in the third round are Olin Industries, Inc., with 110,000 tons of capacity and Harvey Machine Co. with 54,000 tons. Wheland is getting set to build a 50,000-ton plant.

Anaconda Aluminum Co. was the only other newcomer since the start of Korean hostilities, coming in under an earlier round for something like 54,000 tons of capacity.

Private Capital—According to DPA, the plant will be privately financed. This was one of the roadblocks that held Wheland

MONTHLY AVERAGE PRICES	
The average prices of the major non-ferrous metals in January based on quotations appearing in THE IRON AGE were as follows:	
	Cents Per Pound
Electrolytic copper, Conn. Valley .	24.50
Lake Copper, delivered	24.625
Straits tin, New York	\$1.215
Zinc, East St. Louis	12.596
Zinc, New York	13.426
Lead, St. Louis	13.992
Lead, New York	14.192

back during the early stages of negotiations for third round construction. Cost of the plant is estimated at \$70 million.

It is reported that the company has a firm power agreement with the Tennessee Valley Authority, one of the things that probably made private financing a lot easier. Initial operation of the reduction plant is tentatively set for late next year.

Titanium Expansion — At government request, E. I. DuPont de Nemours & Co. is expanding titanium sponge production facilities at its Newport, Del., plant and is planning to begin shortly at its Edge Moor, Del., plant. This expansion is expected to produce 13,500 additional tons of the medium weight metal over the next 5 years.

Production of titanium in 1952 totaled about 1200 tons in the U. S.

Controls End — Price controls are set to drop out of the picture on Apr. 30 (See p. 113). This announcement is accompanied by great joy in some circles. But what will it mean to the metals?

With lead and zinc already selling at well below their respective ceilings, elimination of controls won't mean much directly. If a general round of price-wage increases is forthcoming, there may be slight increases but supply and demand will rule. Feeling in these metals is a bit soft at the moment.

Tin is in a unique position. The ceiling is about \$1.83, varying with different sellers. But this has only been academic since Reconstruction Finance Corp. has established a resale price of 1.21½ per lb and nobody can sell at anything higher. This situation will continue.

Aluminum—Producers and fabricators of aluminum have just been granted an increase of 1¢ per lb for pig and ingot and 5 pct (not 6 pct as mistakenly reported on this page last week) on semi-finished, finished and fabricated aluminum. Chances are that the base metal price will stay at its present level, though some of the new producers might try to get more if market conditions permit.

There may, however, be a slight adjustment in mill product prices. The producers last summer asked for a 10 to 12 pct hike but received only 9.2 pct in the two increases allowed. They might go the rest of the way.

Copper and Brass—Here's one to look out for. Pressure in the copper cauldron has been working on the lid for some time. Some leaks have occurred in the form of special ceilings granted to higher cost producers. With the lid off, the price will probably go up several cents per lb. Possibly settling at just below the 30¢ level.

NONFERROUS METAL PRICES

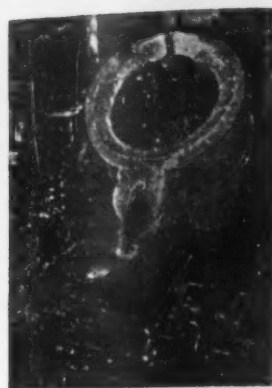
	Jan. 28	Jan. 29	Jan. 30	Jan. 31	Feb. 2	Feb. 3
Copper, electro, Conn.	24.50	24.50	24.50	24.50	24.50	24.50
Copper, Lake delivered	24.625	24.625	24.625	24.625	24.625	24.625
Tin, Straits, New York	\$1.21½	\$1.21½	\$1.21½	....	\$1.21½	\$1.21½*
Zinc, East St. Louis	12.00	12.00	12.00	12.00	12.00	12.00
Lead, St. Louis	13.80	13.80	13.80	13.80	13.30	13.30

Note: Quotations are going prices.

*Tentative.

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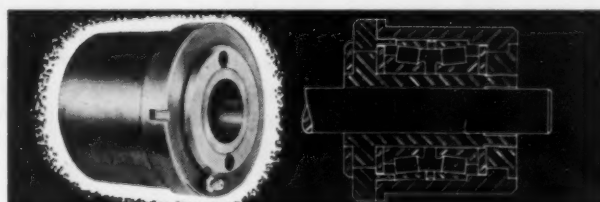
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Iron and Steel Scrap Markets

What Happens When Price Controls End?

These controls will probably go out on Apr. 30 . . . Meanwhile mills still have tall stocks and may start working them down . . . Some dealers shy on buying ceiling scrap now.

In his State of the Union message President Eisenhower spelled out that price controls would be scrapped on Apr. 30. (See p. 113.) The scrap market will be freed—at a time when mills must be seriously considering working off surplus weight from stockpiles of scrap.

This week scrap men are giving more thought about what will happen to scrap prices when controls are lifted. Others are wondering if a sharp weakness may not show up before then. Concern is in the nature of short-term worrying caused by very large mill reserves and a flow of scrap that stayed strong through the winter. There is no doubt that the expanding steel industry will consume enormous tonnages of scrap this year.

But to stress the present uncertainty some dealers were shying away from too heavy investment in yard scrap at ceiling prices because of uncertainty of future prices. As if to substantiate their purchasing pessimism, prices of blast furnace grades slipped this week in Detroit and there were other disquieting reports of mill buying slow-ups and strict inspections.

Scrap men see demand for good openhearth scrap continuing but a weaker market could hit grades that are not overly strong now. End of price controls may make differentials between grades more realistic. Some prices may drop, other may stay put.

Pittsburgh — Lifting of price controls would have little effect on top grades of scrap in this district. Consensus here is that railroad, electric furnace, and industrial scrap would hold their own pricewise. Some of the poorer grades, notably No. 2 bundles, would likely be first to reflect price weakness. Cast market continues weak although demand for quality machin-

ery cast is good. Turnings market is dull.

Chicago—Market, after some signs of optimism last week was growing somewhat more skittish, possibly due to reports of poor sales in other areas. Blast furnace was a particularly weak item, but openhearth, electric furnace and blast furnace sales were at the going price. Cast market began to slow down again.

Philadelphia—All steel producers in the district are reported to have slimmed down their buying of scrap for February. Rejections are on the increase, one small mill rejecting more than it accepted. Prices are still at ceiling on openhearth and electric furnace grades but supply has met demand.

New York—There are a few indications of a slow-up in mill buying. Fairless Works starts in its third openhearth this week and the effect of this on steelmaking grades is awaited. Mills insist on scrap shipments meeting specifications to the letter and one broker said they won't hesitate to knock the grading down a notch if it doesn't.

Detroit—Supply of blast furnace grades caught up with demand with a vengeance this week, dropping prices \$1 to \$3 below ceiling for dealer scrap. Weakness had been apparent for some time, but purchases at critical times had maintained the ceiling level. Even at several dollars below ceiling, sales of blast furnace grades were few.

Cleveland—One large consumer is still restricting shipments of openhearth and plans to maintain present inventories, now estimated to total over 30 days. Steady flow of good scrap is flanked by brisk demand for low phos and lagging cast consumption. Colder weather hasn't affected plant scrap but yard production and collections have been hampered.

Birmingham—The scrap situation in the Southeast is little changed.

Some scrap is moving north, but mills appear to be buying cautiously and with an eye on freight rates. Southern mills, too, are limiting the amount of freight they will absorb. Dealers are beginning to wonder how long prices will remain at ceiling and are hesitating to build up inventories at ceiling prices.

St. Louis — Country dealers are shipping fairly well against orders for scrap iron placed in November and December, but they seem unwilling to make further commitments because of the shortage of supplies. Mills are willing to buy whatever tonnages brokers have to offer, but have fairly comfortable inventories. Prices on openhearth grades are firm.

Cincinnati—Talk of early decontrol has dealers and brokers here wondering what will happen to prices in a free market. Most seem to feel supply and demand will keep an effective lid on the possibility of a runaway market. They admit electric furnace might skyrocket temporarily but believe openhearth will increase only slightly while cast and blast decline to some extent.

Buffalo—Cast scrap prices fell an additional \$2 to \$3 a ton on new business placed here. Cast prices are now \$4 to \$5 below ceiling levels. Cupola is quoted within a range of \$44 to \$45. Strength however continues to rule steelmaking grades as one of the area's top consumers placed new contracts for approximately 15,000 tons at control levels. Dealers report new receipts light.

Boston—The long-awaited reopening of the Mystic Iron Works blast furnace, down for 2 months, is expected momentarily. As soon as it happens, the scrap trade expects to do some business in foundry steel, 1 ft and under, and short turnings. Otherwise the New England trade is plodding along with not much change.

West Coast—Scrap dealers were gloomy over the cut in most steelmaking grade prices in San Francisco and Los Angeles last week. February is expected to be the bottom of the market as mills work on accumulated inventories. In March, however, things are expected to pick up. Prices last week were unchanged except for notice of Feb. 1 drop of \$2 most steelmaking grades.

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NEWS OF USED, REBUILT AND SURPLUS MACHINERY

Seven Pioneered—A group of used machinery dealers recently received postcards requesting information about their sales. Because seven of the dealers replied, the used machinery industry has made a first step towards what may be its greatest achievement.

The answers to the questionnaire are the first results of an attempt by the New York-New England Chapter of the Machinery Dealers National Assn. to set up a monthly survey of used machinery sales. If the local test is successful, MDNA hopes to adopt the plan on a national basis.

First Figures—Though the seven returns represent answers from only 17.5 pct of the chapter's 40-firm membership, they are important because they are believed to be the only statistics ever compiled on used machinery sales (THE IRON AGE, Dec. 4, 1952, p. 242).

Since so few dealers replied, results of the survey are meaningless. But, as an indication of the information that can be obtained through a statistical program, the figures are interesting.

How Bad Was It?—Five of the seven dealers reporting said dollar volume of sales last year averaged 40 pct less than in 1951. One dealer showed a 5 pct increase, while the other boosted business volume 40 pct.

In comparing volume for the last 2 months of 1952, four of the six dealers answering this question surprisingly reported that sales were 60 pct higher in December than in November.

Another questionnaire is now being mailed out asking dealers to compare the percentage of increase or decrease in the dollar volume of sales in January and December. To get as many dealers as possible to send in replies, firm names are not requested.

If It Works—If the local effort is successful and the statistical program is adopted on a national scale, the plan is to code returns so they can be identified. This would make it possible to determine whether trends are different in large and small firms and also provide a way to compensate for variations caused by failure of firms to send in their regular report.

It is also hoped that the survey would eventually give sales in terms of dollars as well as percentages. Main obstacle is breaking down dealer resistance to releasing information about how much business they are doing.

For Self-Defense—Chief value of the program would be to help the industry protect itself in dealings with the government. It is impossible to prove the true importance of the used machinery industry because no statistics are available. Many dealers believe used volume sometimes tops that of the new machinery industry, but there are no facts to back up this belief.

Since machinery manufacturers are loaded with sales and production figures, they can do a much better job of explaining their needs in Washington than can used machinery spokesmen tongue-tied by insufficient data.

How It Helps—Monthly figures showing the trend of activity in the used machinery market could also be used by dealers in their own business. If the study showed sales were dropping sharply, dealers might be less anxious to stock equipment. Naturally, this type of information would be more valuable when there is a return to an overall buyer's market.

Some dealers say they have enough experience to judge the market without statistics. This may be true, but for younger men without experience the surveys could be an extremely valuable guide.